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1.0 Background

The Explosive Ordnance Disposal (EOD) mission is to eliminate hazards from unexploded ordnance (UXO) and improvised explosive devices (IEDs) that jeopardize operations conducted in support of national military strategy by providing specially trained, combat ready, and highly mobile forces. As the only military force trained for this mission, EOD personnel must be prepared to rapidly deal with land, sea, and air threats from conventional, special (nuclear, biological, and chemical), and unconventional ordnance (e.g. IEDs, booby traps, and captured enemy ammunition).

The Joint Laser Ordnance Neutralization System (JLONS) shall consist of a modular laser system that is to be capable of being integrated within the Cougar. The system shall be designed to use a laser to neutralize ordnance and Improvised Explosive Devices (IEDs) in accordance

with the performance parameters and other attributes detailed throughout this document and the JLONS System Specification (ref. X).

2.0 Scope of Work

The contractor shall design, develop, fabricate, integrate, test and evaluate performance of a JLONS in accordance with this statement of work and the JLONS performance specification. The contractor shall develop two Engineering Development Models (EDM) and two Production Representative Models (PRM).

The EDMs shall be developed using the preliminary design to provide a test and evaluation asset that will be used to evaluate the preliminary design. The EDMs shall be delivered to the Government. The Government reserves the right to have the Contractor upgrade the EDMs to the final baseline configuration of the JLONS.

The PRMs shall be developed using the critical design to provide a test and evaluation asset that will be used to evaluate the baseline design. The PRMs shall be delivered to the Government in the production baseline configuration of the JLONS.

In addition to the engineering services required for the performance of this contract, the contractor shall provide program management, configuration management, and data management. The Contractor shall furnish all services, materials, and equipment (except those to be provided as Government Furnished Equipment (GFE) and Government Furnished Information (GFI). The Contractor shall provide all facilities except where otherwise noted in this SOW.

3.0 Description of Work

3.1 Task 1 - Program Management

The Contractor shall designate a Program Manager who shall have responsibility for all aspects of this SOW and the authority to commit the Contractor to specific actions within the scope of the contract. The Contractor shall organize, coordinate, control and report the status [ELIN Axxx] of all program activities including those activities assigned to subcontractors, to ensure the correct and timely delivery of all supplies and services specified in this SOW.

The contractor shall establish and maintain management operations that shall include the following areas:

- (a) Program Planning and Control
- (b) Subcontractor Control
- (c) Financial Management
- (d) Data Management
- (e) Management and Accountability for Government Furnished Equipment, Material or Information.

(f) Risk Management

The contractor shall develop and implement a Management Program that clearly defines how the JLONS Program shall be planned, organized, managed and controlled including project definition and risk reduction. A Work Breakdown Structure (WBS) shall be developed in sufficient detail to identify Contractor and subcontractor responsibilities.

The contractor shall establish and implement a program management office function to manage all technical performance, including reliability, maintainability, ILS, cost, schedule, and data delivery requirements of the contract.

(CDRL A001: EIS/ Master Program Schedule)

(CDRL ZZZZ: EIS/ WBS)

3.1.1 Management Approach

The contractor shall support and provide membership on the Government's Program Integrated Product Teams (PIPT). The Government has currently stood up Systems Engineering, Safety, Test and Evaluation, Integrated Logistics, and Contracting PIPT's.

3.1.1.1 Integrated Product Teams and Working Groups

The Contractor (including subcontractors and vendors as necessary) shall attend, present as necessary, and participate in Systems Engineering Program Integrated Product Team (SE PIPT), the Safety PIPT, the Test and Evaluation PIPT (T&E PIPT), and the Integrated Logistics Support PIPT (ILS PIPT).

The JLONS Program IPT (PIPT) shall manage the efforts of the PIPTs and the working groups from program inception through a successful baseline demonstration. In addition, the Government may establish, and the Contractor shall participate in, ad hoc PIPTs and Working Groups (WGs), as the need arises. PIPT and WG meetings shall be held at either the Contractor's facility or a Government specified facility.

The PIPTs shall function in accordance with their respective charters. Nothing in the PIPT process shall relieve the Contractor of the responsibility to meet the contract requirements or change the contract requirements. In the event that a change to the contract is required, a contract modification will be issued by the Contracting Officer.

3.1.1.1.1 Working Groups (WGs)

Working groups (WGs) may also be established under the auspices of one of the IPTs in support of critical but focused tasks requiring close Government-contractor coordination. WGs shall be co-chaired by the contractor and Government and shall be composed of appropriate engineering specialties and business functions from the contractor and Government.

3.1.2 Program Schedule

The contractor shall develop and maintain a detailed program schedule as a part of the integrated program planning, which can be used for tracking of program execution. The detailed program schedule shall include performing activities and resources. The following phases and milestones shall be used.

- a. Contract Award
- b. System Requirements Review
- c. Design Phase
- d. PDR
- e. System/Sub-system Design
- f. EDM Demonstration
- g. DT-I
- h. Redesign
- i. CDR
- j. PRM Fabrication
- k. PRM Demonstration
- l. Physical Configuration Audit
- m. DT-II
- n. System Verification Review
- o. Delivery of PRM and EDM to Government

These phases and milestones are linked to the Government's planned phases. Further subdivisions are permissible. Deliverables in this SOW are to be tied to these major phases/milestones. Contractor deliverables not specifically called out in this SOW shall be tied to these phases/milestone in the contractor's schedule. Schedule revisions shall not affect the required delivery dates. (CDRL H00X)

3.1.3 Reviews

JLONS reviews shall include but not be limited to System Requirements Review (SRR), Preliminary Design Review (PDR), Critical Design Review (CDR), quarterly reviews, technical reviews (systems engineering, software, logistics, safety, etc), and PIPT reviews.

3.1.3.1 Program Reviews

The Contractor shall conduct a formal review of the status of all projects every three (3) months at the Contractor's facility for a period of approximately one (1) day [ELIN Axxx]. Specific agenda topics shall include any or all of the following as specified by the COR prior to the review [ELIN Axxx];

- a) cost/schedule performance;
- b) design and technical issues;
- c) hardware and computer software engineering;
- d) risk analysis and management activities;
- e) reliability and maintainability;
- f) test and evaluation activities, plans, results;
- g) configuration management activities;
- h) GFP and GFI status;
- i) manpower utilization projection/actual (3 month history, 9 month future);
- j) data items delivery schedule; and
- k) logistics activities, plans, results;

In addition, when requested by the Government, any unresolved issues requiring the attention of Government and Contractor corporate management shall be disclosed in detail at an executive meeting held separately from the Program Review. Concurrence with meeting minutes does not authorize a change in the program planning chart provided under paragraph 3.1.3 above or any other contract requirement. In the event that a change to the contract is required, a contract modification will be issued by the Contracting Officer.

3.1.3.2 Technical Reviews

The Contractor shall conduct a Preliminary Design Review (PDR), and a Critical Design Review (CDR) in accordance with the Government supplied schedule (Attachment x). Any change or

impact to these dates will require Government concurrence. The Contractor shall address how technical risk management will be implemented.

The Contractor shall generate and provide a review data package [ELIN Axxx] to support the PDR and CDR fifteen (15) days prior to the actual review.

3.1.3.2.1 Software Test Readiness Review

3.1.3.2.1.1 Test Readiness Review (TRR).

3.1.3.2.1.1.1 General.

The TRR shall be a formal review of the contractor's readiness to begin formal CSCI testing. It is conducted after software test procedures are available and CSC integration testing is complete. The purpose of TRR is for the Contracting Officer Representative (COR) to determine whether the contractor is in fact ready to begin CSCI testing. A technical understanding shall be reached on the informal test results, and on the validity and the degree of completeness of the Computer System Operator's Manual (CSOM)(deliverables as tech repts CLIN J00X), Software User's Manual (SUM) (deliverables as tech repts CLIN J00X), and Computer System Diagnostic Manual (CSDM) (deliverables as tech repts CLIN J00X).

3.1.3.2.1.1.2 Items to be reviewed.

The contractor shall present the following for review:

3.1.3.2.1.1.2.1 Requirements changes. Any changes to the Software Requirements Specification(deliverables as tech repts CLIN J00X) or Interface Requirements Specification(s) (deliverables as tech repts CLIN J00X) that have been approved since SRR, and which impact CSCI testing.

3.1.3.2.1.1.2.2 Design changes. Any changes to the Software Design that have been made since PDR and CDR, and which impact CSCI testing.

3.1.3.2.1.1.2.3 Software test plans and descriptions. Any changes to approved Software Test Plans and Software Test Descriptions.

3.1.3.2.1.1.2.4 Software test procedures. Test procedures to be used in conducting CSCI testing, including retest procedures for test anomalies and corrections.

3.1.3.2.1.1.2.5 Software test resources. Status of the development facility hardware, test personnel, and supporting test software and materials, including software test tool qualification and review of the traceability between requirements and their associated tests.

3.1.3.2.1.1.2.6 Test limitations. Identification of all software test limitations.

3.1.3.2.1.1.2.7 Software problems. Summary of software problem status including all known discrepancies of the CSCI and test support software.

3.1.3.2.1.1.2.8 Schedules. Schedules for remaining milestones.

3.1.3.2.1.1.2.9 Documentation Updates. Updates to all evolving and previously delivered CDRL items

3.1.3.2.1.2 Post Review Action.

3.1.3.2.1.2.1 Upon completion of the TRR, the contractor shall publish and distribute via email to NAVEODTECHDIV copies of Review Minutes. The Government will officially acknowledge completion of the TRR via letter.

3.1.3.2.2 System Requirements Review (SRR)

The SRR shall be a formal review of the conceptual design and methodology of the JLONS to establish the system's capability to satisfy the JLONS performance specifications. The contractor shall conduct a SRR covering all system elements at the contractor's facility.

3.1.3.2.2.1 General.

The SRR shall be conducted 60 days after contract award.

3.1.3.2.2.2 Purpose.

The total Systems Engineering Management activity and its output shall be reviewed for responsiveness to the Statement of Work and system/subsystem requirements.

3.1.3.2.2.3 Items to be Reviewed.

Representative items to be reviewed include the results of the following, as appropriate:

- a. Mission and Requirements Analysis
- b. Functional Flow Analysis
- c. Preliminary Requirements Allocation
- d. System/Cost Effectiveness Analysis
- e. Trade studies (e.g. addressing system functions in mission and support hardware/firmware/software).
- f. Synthesis
- g. Logistics Support Analysis
- h. Specialty Discipline Studies (i.e., hardware and software reliability analysis, maintainability analysis, armament integration, electromagnetic compatibility, survivability/vulnerability (including nuclear), inspection methods/techniques analysis, energy management, environmental considerations).

- i. System Interface Studies
- j. Generation of Specification
- k. Program Risk Analysis
- l. Integrated Test Planning
- m. Producibility Analysis Plans
- n. Technical Performance Measurement Planning
- o. Engineering Integration
- p. Data Management Plans
- q. Configuration Management Plans
- r. System Safety
- s. Human Factors Analysis
- t. Value Engineering Studies
- u. Life Cycle Cost Analysis
- v. Preliminary Manufacturing Plans
- w. Manpower Requirements/Personnel Analysis
- x. Milestone Schedules

3.1.3.2.2.3.1 The contractor shall describe his progress and problems in:

3.1.3.2.2.3.1.1 Risk identification and risk ranking (the inter- relationship among system effectiveness analysis, technical performance measurement, intended manufacturing methods, and costs shall be discussed, as appropriate).

3.1.3.2.2.3.1.2 Risk avoidance/reduction and control (the inter- relationships with trade-off studies, test planning, hardware proofing, and technical performance measurement shall be discussed, as appropriate).

3.1.3.2.2.3.1.3 Significant trade-offs among stated system/subsystem specification requirements/constraints and resulting engineering design requirements/constraints, manufacturing methods/process constraints, and logistic/cost of ownership requirements/constraints and unit production cost/design-to-cost objectives.

3.1.3.2.2.3.1.4 Identifying computer resources of the system and partitioning the system into HWCIs and CSCIs. Include any trade-off studies conducted to evaluate alternative approaches

and methods for meeting operational needs and to determine the effects of constraints on the system. Also include any evaluations of logistics, technology, cost, schedule, resource limitations, intelligence estimates, etc., made to determine their impact on the system. In addition, address the following specific trade-offs related to computer resources:

- a. Candidate programming languages and computer architectures evaluated in light of DoD requirements for approved higher order languages and standard instruction set architectures.
- b. Alternative approaches evaluated for implementing security requirements. If an approach has been selected, discuss how it is the most economical balance of elements which meet the total system requirements.
- c. Alternative approaches identified for achieving the operational and support concepts, and, for joint service programs, opportunities for interservice support.

3.1.3.2.2.3.1.5 Producibility and manufacturing considerations which could impact the program decision such as critical components, materials and processes, tooling and test equipment development, production testing methods, long lead items, and facilities/ personnel/skills requirements.

3.1.3.2.2.3.1.6 Significant hazard consideration should be made here to develop requirements and constraints to eliminate or control these system associated hazards.

3.1.3.2.2.4 Post Review Action.

Upon completion of the SRR, the contractor shall publish and distribute copies of Review Minutes. The Government will officially acknowledge completion of the SRR via letter.

3.1.3.2.3 PDR

3.1.3.2.3.1 General.

The PDR shall be a formal technical review of the basic design approach for a configuration item or for a functionally related group of configuration items. It shall be held after the Hardware Development Specification(s)(deliverables as tech repts CLIN H00X), the Software Top Level Design Document(deliverables as tech repts CLIN J00X), the Software Test Plan(deliverables as tech repts CLIN J00X), and the HWCI Test Plan are available, but prior to the start of detailed design.

3.1.3.2.3.2 Items to be Reviewed.

The contractor shall present the following for review by the COR:

3.1.3.2.3.2.1 HWCIs:

- a. Preliminary design synthesis of the hardware Development Specification for the item being reviewed.

- b. Trade-studies and design studies results.
- c. Functional flow, requirements allocation data, and schematic diagrams.
- d. Equipment layout drawings and preliminary drawings, including any proprietary or restricted design/process/ components and information.
- e. Environment control and thermal design aspects
- f. Electromagnetic compatibility of the preliminary design
- g. Power distribution and grounding design aspects
- h. Preliminary mechanical and packaging design of consoles, racks, drawers, printed circuit boards, connectors, etc.
- i. Safety engineering considerations
- j. Security engineering considerations
- k. Survivability/Vulnerability considerations
- l. Preliminary lists of materials, parts, and processes
- m. Pertinent reliability/maintainability/availability data
- n. Preliminary weight data
- o. Development test data
- p. Interface requirements contained in configuration item Development Specifications and interface control data (e.g., interface control drawings) derived from these requirements.
- q. Configuration item development schedule
- r. Mock-ups, models, breadboards, or prototype hardware when appropriate
- s. Producibility and Manufacturing Considerations (e.g., materials, tooling, test equipment, processes, facilities, skills, and inspection techniques). Identify single source, sole source, diminishing source.
- t. Value Engineering Considerations, Preliminary VECs and VECs (if applicable).
- u. Transportability, packaging, and handling considerations
- v. Human Engineering and Biomedical considerations (including life support and Crew Station Requirements).
- w. Standardization considerations

- x. Description and characteristics of commercially available equipment, including any optional capabilities such as special features, interface units, special instructions, controls, formats, etc., (include limitations of commercially available equipment such as failure to meet human engineering, safety, and maintainability requirements of the specification and identify deficiencies).
 - y. Existing documentation (technical orders, commercial manuals, etc.) for commercially available equipment and copies of contractor specifications used to procure equipment shall be made available for review by the COR.
 - z. Firmware to be provided with the system: microprogram logic diagrams and reprogramming/instruction translation algorithm descriptions, fabrication, packaging (integration technology (e.g., LSI, MSI), device types (e.g., CMOS, PMOS)), and special equipment and support software needed for developing, testing, and supporting the firmware.
- aa. Life Cycle Cost Analysis
 - bb. Corrosion prevention/control considerations
 - cc. Findings/Status of Quality Assurance Program
 - dd. Support equipment requirements.

3.1.3.2.3.2.2 CSCIs:

- a. Functional flow. The computer software functional flow embodying all of the requirements allocated from the Software Requirements Specification (deliverables as tech repts CLIN J00X) and Interface Requirements Specification(s) (deliverables as tech repts CLIN J00X) to the individual Top-Level Software Units (TLSU) (deliverables as tech repts CLIN J00X) of the CSCI.
- b. Control functions description. A description of the executive control and start/recovery features for the CSCI shall be available, including method of initiating system operation and features enabling recovery from system malfunction.
- c. CSCI structure. The contractor shall describe the top-level structure of the CSCI, the reasons for choosing the components described, the development methodology which will be used within the constraints of the available computer resources, and any support programs which will be required in order to develop/maintain the CSCI structure and allocation of data storage.
- d. Security. An identification of unique security requirements and a description of the techniques to be used for implementing and maintaining security within the CSCI shall be provided.
- e. Re-entrancy. An identification of any re-entrancy requirements and a description of the techniques for implementing re-entry routines shall be available.

- f. Computer software development facilities. The availability, adequacy, and planned utilization of the computer software development facilities shall be addressed.
 - g. Computer software development facility versus the operational system. The contractor shall provide information relative to unique design features which may exist in a TLSU in order to allow use within the computer software development facility, but which will not exist in the TLSU installed in the operational system. The contractor shall provide information on the design of support programs not explicitly required for the operational system but which will be generated to assist in the development of the CSCI(s). The contractor shall also provide details of the Software Development Library (deliverables as tech repts CLIN J00X)controls.
 - h. Development tools. The contractor shall describe any special simulation, data reduction, or utility tools that are not delivered under the terms of the contract, but which are planned for use during software development.
 - i. Test tools. The contractor shall describe any special test systems, test data, data reduction tools, test computer software, or calibration and diagnostic software that are not deliverable under terms of the contract, but which are planned for use during product development.
 - j. Description and characteristics of commercially available computer resources, including any optional capabilities such as special features, interface units, special instructions, controls, formats, etc. Include limitations of commercially available equipment such as failure to meet human engineering, safety and maintainability requirements of the specification and identify deficiencies.
 - k. Existing documentation (technical orders, commercial manuals, etc.) for commercially available computer resources and copies of contractor specifications used to procure computer resources shall be made available for review by the COR.
 - l. Support resources. The contractor shall describe those resources necessary to support the software and firmware during operational deployment of the system, such as operational and support hardware and software, personnel, special skills, human factors, configuration management, test, and facilities/space.
 - m. Operation and support documents. The preliminary versions of the CSOM, SUM, CSDM, and CRISD shall be reviewed for technical content and compatibility with the top-level design documentation.
 - n. Updated since the last review to all previously delivered software related CDRL items.
 - o. Review considerations applicable to HWCI's as appropriate.
- 3.1.3.2.3.2.3 Support Equipment (SE):
- a. Review considerations applicable to paragraph HWCI's and CSCI's as appropriate.

- b. Verify that the Government furnished SE is planned to be used to the maximum extent possible.
- c. Review progress of long-lead time SE items, identified through interim release and SE Requirements Document (SERD) procedures.
- d. Review progress toward determining total SE requirements for installation, checkout, and test support requirements.
- e. Review the reliability/maintainability/availability of support equipment items.
- f. Identify logistic support requirements for support equipment items and rationale for their selection.
- g. Review calibration requirements.
- h. Describe technical manuals and data availability for support equipment.
- i. Verify compatibility of proposed support equipment with the system maintenance concept.
- j. If a Logistic Support Analysis (LSA) is not done, then review the results of SE trade-off studies for each alternative support concept. For existing SE and printed circuit boards testers, review Maintainability data resulting from the field use of these equipments. Review the cost difference between systems using single or multipurpose SE vs. proposed new SE. Examine technical feasibility in using existing, developmental, and proposed new SE. For mobile systems, review the mobility requirements of support equipment.
- k. Review the relationship of the computer resources in the system/subsystem with those in Automatic Test Equipment (ATE). Relate this to the development of Built In Test Equipment (BITE) and try to reduce the need for complex supporting SE.
- l. Verify on-equipment versus off-equipment maintenance task trade study results, including support equipment impacts.
- m. Review updated list of required support equipment.

3.1.3.2.3.3 Evaluation of Electrical, Mechanical, and Logical Designs.

3.1.3.2.3.3.1 HWCIs.

The HWCI shall be evaluated to:

- a. Determine that the preliminary detail design provides the capability of satisfying the performance characteristics paragraph of the HWCI Development specifications.
- b. Establish compatibility of the HWCI operating characteristics in each mode with overall system design requirements if the HWCI is involved in multi-mode functions.

- c. Establish the existence and nature of physical and functional interfaces between the HWCI and other items of equipment, computer software, and facilities.

3.1.3.2.3.3.2 CSCIs.

The CSCI shall be evaluated to:

- a. Determine whether all interfaces between the CSCI and all other configuration items both internal and external to the system meet the requirements of the Software Requirements Specification and Interface Requirements Specification(s).
- b. Determine whether the top-level design embodies all the requirements of the Software Requirements Specification and Interface Requirements Specification(s).
- c. Determine whether the approved design methodology has been used for the top-level design.
- d. Determine whether the appropriate Human Factors Engineering (HFE) principals have been incorporated in the design.
- e. Determine whether timing and sizing constraints have been met throughout the top-level design.
- f. Determine whether logic affecting system and nuclear safety has been incorporated in the design.

3.1.3.2.3.4 Electromagnetic Compatibility.

Review HWCI design for compliance with electromagnetic compatibility/electromagnetic interference (EMC/EMI) requirements. Use Electromagnetic Compatibility Plan (deliverables as tech repts CLIN H00X) as the basis for this review. Check application of MIL-STDs and MIL-Specs cited by the system/ equipment specification(s) to the HWCI/Subsystem design. Review preliminary EMI test plans (deliverables as tech repts CLIN B00X) to assess adequacy to confirm that EMC requirements have been met.

3.1.3.2.3.5 Design Reliability.

3.1.3.2.3.5.1 Identify the quantitative reliability requirements specified in the Hardware Development and Software Requirements Specification(s), including design allocations, and the complexity of the CSCIs.

3.1.3.2.3.5.2 Review failure rate sources, derating policies, and prediction methods. Review the reliability mathematical models and block diagrams as appropriate.

3.1.3.2.3.5.3 Describe planned actions when predictions are less than specified requirements.

3.1.3.2.3.5.4 Identify and review parts or components which have a critical life or require special consideration, and general plan for handling.

3.1.3.2.3.5.5 Identify applications of redundant HWCI elements. Evaluate the basis for their use and provisions for "on-line" switching of the redundant element.

3.1.3.2.3.5.6 Review critical signal paths to determine that a fail- safe/fail-soft design has been provided.

3.1.3.2.3.5.7 Review margins of safety for HWCI elements between functional requirements and design provisions for elements, such as: power supplies, transmitter modules, motors, and hydraulic pumps. Similarly, review structural elements to determine that adequate margins of safety shall be provided between operational stresses and design strengths.

3.1.3.2.3.5.8 Review Reliability Design Guidelines for HWCI elements to insure that design reliability concepts shall be available and used by equipment designers. Reliability Design Guidelines shall include, as a minimum, part application guidelines (electrical derating, thermal derating, part parameter tolerances), part selection order of preference, prohibited parts/materials, reliability apportionments/predictions, and management procedures to ensure compliance with the guidelines.

3.1.3.2.3.5.9 Review for HWCI elements preliminary reliability demonstration plan: failure counting ground rules, accept-reject criteria, number of test articles, test location and environment, planned starting date, and test duration.

3.1.3.2.3.5.10 Review elements of reliability program plan to determine that each task has been initiated toward achieving specified requirements.

3.1.3.2.3.5.11 Review subcontractor/supplier reliability controls.

3.1.3.2.3.6 Design Maintainability.

3.1.3.2.3.6.1 Identify the quantitative maintainability requirements specified in the hardware Development and Software Requirements Specifications; if applicable, compare preliminary predictions with specified requirements.

3.1.3.2.3.6.2 Review HWCI preventive maintenance schedules in terms of frequencies, durations, and compatibility with system schedules.

3.1.3.2.3.6.3 Review repair rate sources and prediction methods.

3.1.3.2.3.6.4 Review planned actions when predictions indicate that specified requirements will not be attained.

3.1.3.2.3.6.5 Review planned designs for accessibility, testability, and ease of maintenance characteristics (including provisions for automatic or operator-controlled recovery from failure/malfunctions) to determine consistency with specified requirements.

3.1.3.2.3.6.6 Determine if planned HWCI design indicates that parts, assemblies, and components will be so placed that there is sufficient space to use test probes, soldering irons, and

other tools without difficulty and that they are placed so that structural members of units do not prevent access to them or their ease of removal.

3.1.3.2.3.6.7 Review provisions for diagnosing cause(s) of failure; means for localizing source to lowest replaceable element; adequacy and locations of planned test points; and planned system diagnostics that provide a means for isolating faults to and within the configuration item. This review shall encompass on-line diagnostics, off-line diagnostics, and proposed technical orders and/or commercial manuals.

3.1.3.2.3.6.8 Review for HWCIs the Design for Maintainability Checklist to insure that listed design principles shall lead to a mature maintainability design. Determine that contractor design engineers are using the checklist.

3.1.3.2.3.6.9 Evaluate for HWCIs the preliminary maintainability demonstration plan, including number of maintenance tasks that shall be accomplished; accept-reject criteria; general plans for introducing faults into the HWCIs and personnel involved in the demonstration.

3.1.3.2.3.6.10 Review elements of maintainability program plan to determine that each task has been initiated towards achieving specified requirements.

3.1.3.2.3.6.11 Insure that consideration has been given to optimizing the system/item from a maintainability and maintenance viewpoint and that it is supportable within the maintenance concept as developed. Also, for HWCIs insure that a Repair Level Analysis (RLA) (deliverable later as tech rept CDRL D00X) has been considered.

3.1.3.2.3.7 Human Factors.

3.1.3.2.3.7.1 The contractor shall present evidence that substantiates the functional allocation decisions. The Review shall cover all operational and maintenance functions of the configuration item. In particular, ensure that the approach to be followed emphasizes the functional integrity of the man with the machine to accomplish a system operation.

3.1.3.2.3.7.2 Review design data, design descriptions and drawings on system operations, equipments, and facilities to insure that human performance requirements of the hardware Development and Software Requirements Specifications are met. Examples of the types of design information to be reviewed are:

- a. Operating modes for each display station, and for each mode, the functions performed, the displays and control used, etc.
- b. The exact format and content of each display, including data locations, spaces, abbreviations, the number of digits, all special symbols (Pictographic), alert mechanisms (e.g., flashing rates), etc.
- c. The control and data entry devices and formats including keyboards, special function keys, cursor control, etc.

- d. The format of all operator inputs, together with provisions for error detection and correction.
- e. All status, error, and data printouts - including formats, headings, data units, abbreviations, spacings, columns, etc.

These should be presented in sufficient detail to allow COR personnel to judge adequacy from a human usability standpoint, and design personnel to know what is required, and test personnel to prepare tests.

3.1.3.2.3.7.3 Make recommendations to update the System/Subsystem, or Software Requirements Specification and Interface Requirements Specification(s) in cases where requirements for human performance need to be more detailed.

3.1.3.2.3.7.4 Review man/machine functions to insure that man's capabilities are utilized and that his limitations are not exceeded.

3.1.3.2.3.8 System Safety.

3.1.3.2.3.8.1 Review results of configuration item safety analyses and quantitative hazard analyses.

3.1.3.2.3.8.2 Review results of system and intra-system safety interfaces and trade-off studies affecting the configuration item.

3.1.3.2.3.8.3 Review safety requirements levied on subcontractors.

3.1.3.2.3.8.4 Review known special areas of safety, peculiar to the nature of the system (e.g., fuel handling, fire protection, high levels of radiated energy, high voltage protection, safety interlocks, etc.).

3.1.3.2.3.8.5 Review results of preliminary safety tests (if appropriate).

3.1.3.2.3.8.6 Generally review adequacy and completeness of configuration item from design safety viewpoint.

3.1.3.2.3.8.7 Review compliance of commercially available configuration items or configuration item components with system safety requirements and identify modifications to such equipment, if required.

3.1.3.2.3.9 Natural Environment.

3.1.3.2.3.9.1 Review contractor's planned design approach toward meeting climatic conditions (operating and non-operating ranges for temperature, humidity, etc.) that are specified in the HWCI Development Specification.

3.1.3.2.3.9.2 Insure that the contractor clearly understands the effect of, and the interactions between, the natural aerospace environment and HWCI design. In cases where the effect and

interactions are not known or are ambiguous, insure that studies are in progress or planned to make these determinations.

3.1.3.2.3.10 Equipment and Part Standardization.

3.1.3.2.3.10.1 Equipment and Components:

- a. Review current and planned contractor actions to determine that equipment or components for which standards or specifications exist shall be used whenever practical. (Standard item with NSN should have first preference).
- b. Review specific trade-offs or modifications that maybe required of existing designs if existing items are, or will be, incorporated in the HWCI.
- c. Existing designs will be reviewed for use or non-use based on the potential impact on the overall program in the following areas:
 - (1) Performance
 - (2) Cost
 - (3) Time
 - (4) Weight
 - (5) Size
 - (6) Reliability
 - (7) Maintainability
 - (8) Supportability
 - (9) Producibility
- d. Review HWCI design to identify areas where a practical design change would materially increase the number of standard items that could be incorporated.
- e. Insure that Critical Item Specifications(deliverables as tech repts CDRL H00X) shall be prepared for hardware items identified as engineering or logistics critical.

3.1.3.2.3.10.2 Parts Standardization and Interchangeability:

- a. Review procedures to determine if maximum practical use will be made of parts built to approved standards or specifications. The potential impact on the overall program is to be evaluated when a part built to approved standards and specifications cannot be used for any of the following reasons:
 - (1) Performance

- (2) Weight
 - (3) Size
 - (4) Reliability/Maintainability/Availability
 - (5) Supportability
 - (6) Survivability (including nuclear)
- b. Identify potential design changes that will permit a greater use of standard or preferred parts and evaluate the trade-offs.
 - c. Insure understanding of parts control program operations for selection and approval of parts in new design or major modifications.
 - d. Review status of the Program Parts Selection List.
 - e. Review status of all non-standard parts identified.
 - f. Review pending parts control actions that may cause program slippages, such as non-availability of tested parts.

3.1.3.2.3.10.3 Assignment of Official Nomenclature:

- a. Insure understanding of procedure for obtaining assignment of nomenclature and approval of nameplates.
- b. Determine that a nomenclature conference has been held and agreement has been reached with the COR on the level of nomenclature; i.e., system, set, central, group, component, sub-assembly, unit, etc.

3.1.3.2.3.11 Transportability.

3.1.3.2.3.11.1 Review HWCI to determine if design meets contracts requirements governing size and weight to permit economical handling, loading, securing, transporting, and disassembly for shipment within existing capabilities of military and commercial carriers. Identify potential outsized and overweight items. Identify system/items defined as being hazardous. Ensure packaging afforded hazardous items complies with hazardous materials regulations.

3.1.3.2.3.11.2 Identify HWCI's requiring special temperature and humidity control or those possessing sensitive and shock susceptibility characteristics. Determine special transportation requirements and availability for use with these HWCI's.

3.1.3.2.3.11.3 Review Transportability Analysis to determine that transportation conditions have been evaluated and that these conditions are reflected in the design of protective, shipping, and handling devices. In addition to size and weight characteristics, determine that analysis includes provisions for temperature and humidity controls, minimization of sensitivity, susceptibility to shock, and transit damage.

3.1.3.2.3.12 Test.

3.1.3.2.3.12.1 Review all changes to the System/Subsystem, HWCI Development, Software Requirements, and Interface Requirements Specifications subsequent to the established Allocated Baseline to determine whether Section 4.0 of all these specifications adequately reflects these changes.

3.1.3.2.3.12.2 Review information to be provided by the contractor regarding test concepts for Development Test and Evaluation (DT&E) testing (both informal and formal). Information shall include:

- a. The organization and responsibilities of the group that will be responsible for test.
- b. The management of his in-house development test effort provides for:
 - (1) Test Methods (plans/procedures)
 - (2) Test Reports
 - (3) Resolution of problems and errors
 - (4) Retest procedure
 - (5) Change control and configuration management
 - (6) Identification of any special test tools that are not deliverable under the contract.
- c. The methodology to be used to meet quality assurance requirements/qualification requirements, including the test repeatability characteristics and approach to regression testing.
- d. The progress/status of the test effort since the previous reporting milestone.

3.1.3.2.3.12.3 Review interface test requirements specified in Section 4.0 of the hardware Development, Software Requirements, and Interface Requirements Specifications for compatibility, currency, technical adequacy, elimination of redundant test. Insure that all associated test documents reflect these interface requirements.

3.1.3.2.3.12.4 Insure that all test planning documentation has been updated to include new test support requirements and provisions for long-lead time support requirements.

3.1.3.2.3.12.5 Review contractor test data from prior testing to determine if such data negates the need for additional testing.

3.1.3.2.3.12.6 Examine all available breadboards, mock-ups, or devices which will be used in implementing the test program or which affect the test program, for program impact.

3.1.3.2.3.12.7 Review plans for software Unit testing to ensure that they:

- a. Address Unit level sizing, timing, and accuracy requirements.
- b. Present general and specific requirements that will be demonstrated by Unit testing.
- c. Describe the required test-unique support software, hardware, and facilities and the interrelationship of these items.
- d. Describe how, when, and from where the test-unique support items will be obtained.
- e. Provide test schedules consistent with higher level plans.

3.1.3.2.3.12.8 Review plans for CSC integration testing to ensure that they:

- a. Define the type of testing required for each level of the software structure above the unit level.
- b. Present general and specific requirements that will be demonstrated by CSC integration testing.
- c. Describe the required test-unique support software, hardware, and facilities and the interrelationship of these items.
- d. Describe how, when, and from where the test-unique support items will be obtained.
- e. Describe CSC integration test management, to include:
 - (1) Organization and responsibilities of the test team
 - (2) Control procedures to be applied during test
 - (3) Test reporting
 - (4) Review of CSC integration test results
 - (5) Generation of data to be used in CSC integration testing.
- e. Provide test schedules consistent with higher level plans.

3.1.3.2.3.12.9 Review plans for formal CSCI testing to ensure that they:

- a. Define the objective of each CSCI test, and relate the test to the software requirements being tested.
- b. Relate formal CSCI tests to other test phases.
- c. Describe support software, hardware, and facilities required for CSCI testing; and how, when, and from where they will be obtained.
- d. Describe CSCI test roles and responsibilities.

- e. Describe requirements for Government-provided software, hardware, facilities, data, and documentation.
- f. Provide CSCI test schedules consistent with higher- level plans.
- g. Identify software requirements that will be verified by each formal CSCI test.

3.1.3.2.3.13 Maintenance and Maintenance Data (HWCIs).

3.1.3.2.3.13.1 Describe System Maintenance concept for impact on design and SE. Review adequacy of maintenance plans. Coverage shall be provided for Organizational and Depot level maintenance of Government Furnished Equipment (GFE), and Contractor Furnished Equipment (CFE).

3.1.3.2.3.13.2 Determine degree of understanding of the background, purpose, requirements, and usage of Maintenance (failure) Data Collection and Historical/Status Records.

3.1.3.2.3.13.3 Describe method of providing Maintenance, Failure, Reliability, Maintainability Data to COR.

3.1.3.2.3.14 Spares and Government Furnished Property (GFP).

3.1.3.2.3.14.1 Review logistics and provisioning planning to insure full understanding of scope of requirements in these areas and that a reasonable time-phased plan has been developed for accomplishment. Of specific concern are the areas of: provisioning requirements, GFP usage, and spare parts, and support during installation, checkout, and test.

3.1.3.2.3.14.2 Review provisioning actions and identify existing or potential provisioning problems - logistic critical and long- lead time items are identified and evaluated against use of the interim release requirements.

3.1.3.2.3.14.3 Review plans for maximum screening and usage of GFP, and extent plans have been implemented.

3.1.3.2.3.14.4 Review progress toward determining and acquiring total installation, checkout, and test support requirements.

3.1.3.2.3.15 Packaging/SDPE (Special Design Protective Equipment).

3.1.3.2.3.15.1 Analyze all available specifications (System/Subsystem, HWCI Development, Software Requirements, Interface Requirements, and Critical Items) for packaging (Section 5) requirements for each product fabrication and material specification.

3.1.3.2.3.15.2 Evaluate user/operational support requirements and maintenance concepts for effect and influence on package design.

3.1.3.2.3.15.3 Establish that time phased plan for package design development is in consonance with the development of the equipment design.

3.1.3.2.3.15.4 Review planned and/or preliminary equipment designs for ease of packaging and simplicity of package design, and identify areas where a practical design change would materially decrease cost, weight, or volume of packaging required.

3.1.3.2.3.15.5 Review requirements for SDPE necessary to effectively support configuration item during transportation, handling and storage processes. Insure SDPE is categorized as a configuration item utilizing specifications conforming to the types and forms as prescribed in the contract. Review SDPE development/product specifications for adequacy of performance/interface requirements.

3.1.3.2.3.15.6 Determine initial package design baselines, concepts, parameters, constraints, etc., to the extent possible at this phase of the configuration item development process.

3.1.3.2.3.15.7 Insure previously developed and approved package design data for like or similar configuration items is being utilized.

3.1.3.2.3.15.8 Establish plans for trade studies to determine the most economical and desirable packaging design approach needed to satisfy the functional performance and logistic requirements.

3.1.3.2.3.15.9 Verify the adequacy of the prototype package design.

3.1.3.2.3.15.10 Review Section 5 of Specification to insure full understanding by contractor for contractor requirements. Identify package specification used for hazardous materials.

3.1.3.2.3.16 Technical Manuals.

3.1.3.2.3.16.1 Review status of the "Technical Manual Publications Plan" to insure that all aspects of the plan have been considered to the extent that all concerned agencies are apprised of the technical manual coverage to be obtained under this procurement. The suitability of available commercial manuals and/or modifications thereto shall also be determined.

3.1.3.2.3.16.2 Review the availability of technical manuals for validation/verification during the latter phases of DT&E testing.

3.1.3.2.3.16.3 Review as applicable provisions for accomplishing in-process reviews, validation, verification, prepublication, and postpublication reviews.

3.1.3.2.3.17 System Allocation Document.

3.1.3.2.3.17.1 Review the Draft System Allocation Document (deliverables as tech repts CDRL H00X) for completeness and technical adequacy to extent completed.

3.1.3.2.3.17.2 The format shall provide the following minimum information:

- a. Drawing Number

- b. Issue
- c. Number of Sheets
- d. Location
- e. Configuration Item Number
- f. Title
- g. Part Number
- h. Serial Number
- i. Specification Number
- j. Equipment Nomenclature
- k. Configuration Item Quantity
- l. Assembly Drawing

3.1.3.2.3.18 Design Producibility and Manufacturing.

3.1.3.2.3.18.1 The contractor shall demonstrate and present evidence that manufacturing engineering will be integrated into the design process.

- a. The contractor shall provide evidence of performing producibility analyses on development hardware trading off design requirements against manufacturing risk, cost, production, volume, and existing capability/availability. Evidence of such analyses may be in the contractor's own format but must conclusively demonstrate that in-depth analyses were performed by qualified organizations/individuals and the results of those analyses will be incorporated in the design.
- b. Preliminary manufacturing engineering and production planning demonstrations shall address: material and component selection, preliminary production sequencing, methods and flow concepts, new processes, manufacturing risk, equipment and facility utilization for intended rates and volume, production in-process and acceptance test and inspection concepts. (Efforts to maximize productivity in the above areas should be demonstrated.)
- c. Management systems to be utilized will insure that producibility and manufacturing considerations are integrated throughout the development effort.

3.1.3.2.3.18.2 The producibility and manufacturing concerns identified in the SRR shall be updated and expanded to:

- a. Provide evidence that concerns identified in the Manufacturing Feasibility Assessment(deliverables as tech repts) and the Production Capability

Estimate(deliverables as tech repts) have been addressed and that resolutions are planned or have been performed.

- b. Make recommendations including manufacturing technology efforts and provide a schedule of necessary actions to the program office to resolve open manufacturing concerns and reduce manufacturing risk.

3.1.3.2.3.19 Post Review Action.

After completing the PDR, the contractor shall publish and distribute copies of Review minutes. The COR officially acknowledges and establishes the adequacy of the contractor's review performance by notification of:

- a. Approval -- to indicate that the review was satisfactorily completed.
- b. Contingent approval -- to indicate that the review is not considered accomplished until the satisfactorily completion of resultant action items.
- c. Disapproval -- to indicate that the review was seriously inadequate.

3.1.3.2.4 Critical Design Review(s)

3.1.3.2.4.1 General.

The CDR shall be conducted on each configuration item prior to fabrication/production/coding release to insure that the detail design solutions, as reflected in the Draft Hardware Product Specification(deliverables as tech repts CDRL H00X), Software Detailed Design Document (SDDD) (deliverables as tech repts CDRL J00X), Data Base Design Document(s) (DBDD(s)) (deliverables as tech repts CDRL J00X), Interface Design Document(s) (IDD(s)) (deliverables as tech repts CDRL H00X), and engineering drawings satisfy requirements established by the hardware Development Specification and Software Top Level Design Document (STLDD). CDR shall be held after the Computer Software Operator's Manual (CSOM), Software User's Manual (SUM), Computer System Diagnostic Manual (CSDM), Software Programmer's Manual (SPM) (deliverables as tech repts CDRL J00X), and Firmware Support Manual (FSM) (deliverables as tech repts CDRL J00X), have been updated or newly released. The overall technical program risks associated with each configuration item shall also be reviewed on a technical (design and manufacturing), cost and schedule basis. For software, a technical understanding shall be reached on the validity and the degree of completeness of the SDDD, IDD(s), DBDD(s), STD, CRISD, SPM, and FSM, and preliminary versions of the CSOM, SUM, and CSDM.

3.1.3.2.4.1.1 Equipment/Facilities configuration items.

The detail design as disclosed by the hardware Product Specification, drawings, schematics, mockups, etc., shall be reviewed against the HWCI Development Specification performance requirements. For other than facilities, the result of a successful CDR shall be the establishment of the design baseline for detailed fabrication/production planning i.e., the contractor is permitted to use the detail design as presented at CDR and reflected in the hardware Product Specification

for planning for production and, if specifically authorized, for initial fabrication/production efforts.

3.1.3.2.4.1.2 Computer Software configuration items (CSCIs).

The CDR for a CSCI shall be a formal technical review of the CSCI detail design, including data base and interfaces. The primary product of the CDR is a formal identification of specific software documentation which will be released for coding and testing.

3.1.3.2.4.2 Items to be Reviewed. The contractor shall present the following for review by the COR:

3.1.3.2.4.2.1 HWCI

- a. Adequacy of the detail design reflected in the draft hardware Product Specification in satisfying the requirements of the HWCI Development Specification for the item being reviewed.
- b. Detail engineering drawings for the HWCI including schematic diagrams.
- c. Adequacy of the detailed design in the following areas:
 - (1) Electrical design
 - (2) Mechanical design
 - (3) Environmental control and thermal aspects
 - (4) Electromagnetic compatibility
 - (5) Power generation and grounding
 - (6) Electrical and mechanical interface compatibility
 - (7) Mass properties
 - (8) Reliability/Maintainability/Availability
 - (9) System Safety Engineering
 - (10) Security Engineering
 - (11) Survivability/Vulnerability (including nuclear)
 - (12) Producibility and Manufacturing
 - (13) Transportability, Packaging and handling

- (14) Human Engineering and Biomedical Requirements (including Life Support and Crew Station Requirements)
 - (15) Standardization
 - (16) Design versus Logistics Trade-offs
 - (17) Support equipment requirements
- d. Interface control drawings
 - e. EDM hardware
 - f. Design analysis and test data
 - g. System Allocation Document for HWCI inclusion at each scheduled location.
 - h. Initial Manufacturing Readiness (for example, manufacturing engineering, tooling demonstrations, development and proofing of new materials, processes, methods, tooling, test equipment, procedures, reduction of manufacturing risks to acceptable levels).
 - i. Life cycle costs
 - j. Detail design information on all firmware to be provided with the system.
 - k. Verify corrosion prevention/control considerations to insure materials have been chosen that will be compatible with operating environment.
 - l. Findings/Status of Quality Assurance Program

3.1.3.2.4.2.2 CSCIs.

- a. Software Detailed Design, Data Base Design, and Interface Design Document(s).
- b. Supporting documentation describing results of analyses, testing, etc., as mutually agreed by the COR and the contractor.
- c. System Allocation Document for CSCI inclusion at each scheduled location.
- d. Computer Resources Integrated Support Document.
- e. Software Programmer's Manual
- f. Firmware Support Manual
- g. Progress on activities required by CSCI PDR.
- h. Updated operation and support documents (CSOM, SUM, CSDM).

- i. Schedules for remaining milestones.
- j. Updates since the last review to all previously delivered software related CDRL items.

3.1.3.2.4.2.3 Support Equipment (SE):

- a. Review HWCI and CSCI requirements for SE.
- b. Verify maximum considerations GFE SE
- c. Identify existing or potential SE provisioning problems
- d. Determine qualitative and quantitative adequacy of provisioning drawings and data
- e. Review reliability of SE
- f. Review logistic support requirements for SE items
- g. Review Calibration requirements
- h. Review documentation for SE.

3.1.3.2.4.3 Detailed Evaluation of Electrical, Mechanical, and Logical Designs.

3.1.3.2.4.3.1 HWCI. Detailed block diagrams, schematics, and logic diagrams shall be compared with interface control drawings to determine system compatibility. Analytical and available test data shall be reviewed to insure the hardware Development Specification has been satisfied.

3.1.3.2.4.3.1.1 The contractor shall provide information on firmware which is included in commercially available equipment or to be included in equipment developed under the contract. Firmware in this context includes the microprocessor and associated sequence of micro-instructions necessary to perform the allocated tasks. As a minimum, the information presented during CDR shall provide descriptions and status for the following:

- a. Detailed logic flow diagrams
- b. Processing algorithms
- c. Circuit diagrams
- d. Clock and timing data (e.g., timing charts for micro- instructions)
- e. Memory (e.g., type (RAM, PROM), word length, size (total and spare capacity))
- f. Micro-instruction list and format

- g. Device functional instruction set obtained by implementation of firmware.
- h. Input/output data width (i.e., number of bits for data and control.)
- i. Self-test (diagnostics) within firmware.
- j. Support software for firmware development:
 - (1) Resident assembler
 - (2) Loader
 - (3) Debugging routines
 - (4) Executive (monitor)
 - (5) Non-resident diagnostics
 - (6) Cross assembler and higher level language on host computer
 - (7) Instruction simulator

3.1.3.2.4.3.2 CSCIs.

The contractor shall present the detailed design (including rationale) of the CSCI to include:

- a. The assignment of CSCI requirements to specific Lower- Level Software Units, the criteria and design rules used to accomplish this assignment, and the traceability of Unit and LLSU designs to satisfy CSCI requirements, with emphasis on the necessity and sufficiency of the Units for implementing TLSU design requirements.
- b. The overall information flow between software Units, the method(s) by which each Unit gains control, and the sequencing of Units relative to each other.
- c. The design details of the CSCI, TLSUs, LLSUs, and Units including data definitions, timing and sizing, data and storage requirements and allocations.
- d. The detailed design characteristics of all interfaces, including their data source, destination, interface name and interrelationships; and, if applicable, the design for direct memory access. The contractor shall also give an overview of the key design issues of the interface software design, and indicate whether data flow formats are fixed or subject to extensive dynamic changes.
- e. The detailed characteristics of the data base. Data base structure and detailed design, including all files, records, fields, and items. Access rules, how file sharing will be controlled, procedures for data base recovery/ regeneration from a system failure, rules for data base manipulation, rules for maintaining file integrity, rules for usage reporting, and rules governing the types and depth of access shall be defined. Data management

rules and algorithms for implementing them shall be described. Details of the language required by the user to access the data base shall also be described.

3.1.3.2.4.4 Electromagnetic Compatibility.

- a. Review contractor EMC design of all HWCI's. Determine compliance with requirements of the Electromagnetic Compatibility Plan and HWCI specifications.
- b. Review system EMC including effects on the electromagnetic environment (inter-system EMC) and intra- system EMC. Determine acceptability of EMC design and progress toward meeting contractual EMC requirements.
- c. Review EMC test plans. Determine adequacy to confirm EMC design characteristics of the system/HWCI/subsystem.

3.1.3.2.4.5 Design Reliability.

3.1.3.2.4.5.1 Review the most recent predictions of hardware and software reliability and compare against requirements specified in hardware Development Specification and Software Requirements Specification. For hardware, predictions are substantiated by review of parts application stress data.

3.1.3.2.4.5.2 Review applications of parts or configuration items with minimum life, or those which require special consideration to insure their effect on system performance is minimized.

3.1.3.2.4.5.3 Review completed Reliability Design Review Checklist(deliverables as tech repts CDRL C00X), to insure principles have been satisfactorily reflected in the configuration item design.

3.1.3.2.4.5.4 Review applications of redundant configuration item elements or components to establish that expectations have materialized since the PDR.

3.1.3.2.4.5.5 Review detailed HWCI Reliability Demonstration Plan (deliverables as tech repts CDRL C00X),for compatibility with specified test requirements. The number of test articles, schedules, locations, test conditions, and personnel involved are reviewed to insure a mutual understanding of the plan and to provide overall planning information to activities concerned.

3.1.3.2.4.5.6 Review the failure data reporting procedures and methods for determination of failure trends.

3.1.3.2.4.5.7 Review the thermal analysis of components, printed circuit cards, modules, etc. Determine if these data are used in performing the detailed reliability stress predictions.

3.1.3.2.4.5.8 Review on-line diagnostic programs, off-line diagnostic programs, support equipment, and preliminary technical orders (and/or commercial manuals) for compliance with the system maintenance concept and specification requirements.

3.1.3.2.4.5.9 Review software reliability prediction model and its updates based upon test data and refined predictions of component usage rates and complexity factors.

3.1.3.2.4.6 Design Maintainability.

3.1.3.2.4.6.1 Review the most recent predictions of quantitative maintainability and compare these against requirements specified in the HWCI Development Specification and Software Requirements Specification.

3.1.3.2.4.6.2 Review preventive maintenance frequencies and durations for compatibility with overall system requirements and planning criteria.

3.1.3.2.4.6.3 Identify unique maintenance procedures required for the configuration item during operational use and evaluate their total effects on system maintenance concepts. Assure that system is optimized from a maintenance and maintainability viewpoint and conforms with the planned maintenance concept. This shall include a review of provisions for automatic, semi-automatic, and manual recovery from hardware/software failures and malfunctions.

3.1.3.2.4.6.4 Identify design-for-maintainability criteria provided by the checklist in the design detail to insure that criteria have, in fact been incorporated.

3.1.3.2.4.6.5 Determine if parts, assemblies, and other items are so placed that there is sufficient space to use test probes, soldering irons, and other tools without difficulty and that they are placed so that structural members of units do not prevent access to them or their ease of removal.

3.1.3.2.4.6.6 Review detailed maintainability demonstration plan for compatibility with specified test requirements. Supplemental information is provided and reviewed to insure a mutual understanding of the plan and to provide overall planning information to activities concerned.

3.1.3.2.4.7 Human Factors.

3.1.3.2.4.7.1 Review detail design presented on drawings, schematics, mockups, or actual hardware to determine that it meets human performance requirements of the HWCI Development Specification and Software Requirements Specification. Interface Requirements Specification(s), and accepted human engineering practices.

3.1.3.2.4.7.2 Demonstrate by checklist or other formal means the adequacy of design for human performance.

3.1.3.2.4.7.3 Review each facet of design for man/machine compatibility. Review time/cost/effectiveness considerations and forced trade-offs of human engineering design.

3.1.3.2.4.7.4 Evaluate the following human engineering/biomedical design factors:

- a. Operator controls
- b. Operator displays

- c. Maintenance features
- d. Anthropometry
- e. Safety features and emergency equipment
- f. Work space layout
- g. Internal environmental conditions (noise, lighting, ventilation, etc.)
- h. Training equipment
- i. Personnel accommodations

3.1.3.2.4.8 System Safety.

3.1.3.2.4.8.1 Review configuration item detail design for compliance to safety design requirements.

3.1.3.2.4.8.2 Review acceptance test requirements to insure adequate safety requirements are reflected therein.

3.1.3.2.4.8.3 Evaluate adequacy of detailed design for safety and protective equipment/devices.

3.1.3.2.4.8.4 Review configuration item operational maintenance safety analyses and procedures.

3.1.3.2.4.9 Natural Environment.

3.1.3.2.4.9.1 Review detail design to determine that it meets natural environment requirements of the hardware Development Specification.

3.1.3.2.4.9.2 Insure that studies have been accomplished concerning effects of the natural environment on, or interactions with, the HWCI. Studies which have been in progress shall be complete at this time.

3.1.3.2.4.10 Equipment and Parts Standardization.

3.1.3.2.4.10.1 Equipment and Components.

Determine that every reasonable action has been taken to fulfil the standardization requirements for use of standard items (standard item with NSN should be first preference) and to obtain approval for use of non-standard or non-preferred items. Accordingly, the following criteria shall be evaluated:

- a. Data sources that were reviewed.
- b. Factors that were considered in the decision to reject known similar, existing designs.

- c. Factors that were considered in decisions to accept any existing designs which were incorporated, and the trade- offs, if any, that had to be made.

3.1.3.2.4.10.2 Parts

- a. Determine whether there are any outstanding non-standard or non-preferred parts approval requests and action necessary for approval or disapproval. (Status of parts control program operations).
- b. Identify non-standard-non-preferred parts approval problems and status of actions toward resolving the problems.
- c. Review potential fabrication/production line delays due to non-availability of standard or preferred parts. In such cases, determine whether it is planned to request use of parts which may be replaced by standard items during subsequent support repair cycles. Assure that appropriate documentation makes note of these items and that standard replacement items shall be provisioned for support and used for repair.
- d. Require certification that maximum practical inter- changeability of parts exists among components, assemblies, and HWCIs. Reservations concerning interchangeability are identified, particularly for hardness critical items.
- e. Sample preliminary drawings and cross check to insure that parts indicated on the drawings are compatible with the Program Parts Selection List.

3.1.3.2.4.10.3 Assignment of Official Nomenclature.

- a. Determine whether official nomenclature and approval of nameplates have been obtained to extent practical.
- b. Determine whether DD Form 61, Request for Nomenclature, has been processed to the agreed level of indenture.
- c. Insure that approved nomenclature has been reflected in the Development and Product Specifications.
- d. Identify problems associated with nomenclature requests (DD-61s) together with status of actions towards resolving the problems.
- e. Insure that a software inventory numbering system has been agreed to and implemented to the CSCI level.

3.1.3.2.4.11 Transportability.

3.1.3.2.4.11.1 Review transportability evaluations accomplished for those items identified as outsized, overweight, sensitive, and/or requiring special temperature and humidity controls.

3.1.3.2.4.11.2 Review actions taken as a result of the above evaluation to insure adequate facilities and military or commercial transporting equipment are available to support system requirements during Production and Deployment Phases.

3.1.3.2.4.11.3 Review design of special materials handling equipment, when required, and action taken to acquire equipment.

3.1.3.2.4.11.4 Insure transportability approval has been annotated on design documents and shall remain as long as no design changes are made that modify significant transportability parameters.

3.1.3.2.4.11.5 Identify equipment to be test loaded for air transportability of material in Military Aircraft.

3.1.3.2.4.12 Test.

3.1.3.2.4.12.1 Review updating changes to all specifications subsequent to the PDR, to determine whether Section 4.0 of the specifications adequately reflects these changes.

3.1.3.2.4.12.2 Review all available test documentation for currency, technical adequacy, and compatibility with Section 4.0 of all Specification requirements.

3.1.3.2.4.12.3 For any development model, prototype, etc., on which testing may have been performed, examine test results for design compliance with hardware Development, Software Requirements, and Interface Requirements Specification requirements.

3.1.3.2.4.12.4 Review quality assurance provisions/qualification requirements in HWCI Product, Software Requirements, or Interface Requirements Specifications for completeness and technical adequacy. Section 4.0 of these specifications shall include the minimum requirements that the item, materiel, or process must meet to be acceptable.

3.1.3.2.4.12.5 Review all test documentation required to support test requirements of Section 4.0 of HWCI Product Specifications for compatibility, technical adequacy, and completeness.

3.1.3.2.4.12.6 Inspect any breadboards, mockups, or prototype hardware available for test program implications.

3.1.3.2.4.12.7 Review Software Test Descriptions to ensure they are consistent with the Software Test Plan and they thoroughly identify necessary parameters and prerequisites to enable execution of each planned software test and monitoring of test results. As a minimum, test descriptions shall identify the following for each test:

- a. Required preset hardware and software conditions and the necessary input data, including the source for all data.
- b. Criteria for evaluating test results.
- c. Prerequisite conditions to be established or set prior to test execution.

- d. Expected or predicted test results.

3.1.3.2.4.13 Maintenance and Maintenance Data.

3.1.3.2.4.13.1 Review adequacy of maintenance plans.

3.1.3.2.4.13.2 Review status of unresolved maintenance and maintenance data problems since the PDR.

3.1.3.2.4.1450.15 Spare Parts and Government Furnished Property (GFP).

3.1.3.2.4.14.1 Review provisioning planning through normal logistics channels. The end objective is to provision by a method, which shall insure system supportability at operational date of the first site.

3.1.3.2.4.14.2 Determine quantitative and qualitative adequacy of provisioning drawings and data. Verify that logistics critical items are listed for consideration and that adequate procedures exist for reflecting design change information in provisioning documentation.

3.1.3.2.4.14.3 Insure support requirements have been determined for installation, checkout, and test. Insure screening has been accomplished and results are included into support requirements lists.

3.1.3.2.4.15 Packaging/SDPE.

3.1.3.2.4.15.1 Review proposed package design to insure that adequate protection to the HWCI, and the media on which the CSCI is recorded, is provided against natural and induced environments/ hazards to which the equipment will be subjected throughout its life cycle, and to insure compliance with contractual requirements. Such analysis shall include, but not be limited to, the following:

- a. Methods of preservation
- b. Physical/mechanical/shock protection including cushioning media, shock mounting and isolation features, load factors, support pads, cushioning devices, blocking and bracing, etc.
- c. Mounting facilities and securing/hold-down provisions
- d. Interior and exterior container designs.
- e. Handling provisions and compatibility with aircraft materials handling system (463L)
- f. Container marking
- g. Consideration and identification of dangerous/hazardous commodities

3.1.3.2.4.15.2 Review design of SDPE HWCI. The analysis of the proposed container or handling, shipping equivalent shall encompass as a minimum:

- a. Location and type of internal mounting or attaching provisions
- b. Vibration - shock isolation features, based on the pre-determined fragility rating (or other constraint of the item to be shipped.)
- c. Service items (indicators, relief valves, etc.)
- d. Environmental control features
- e. External handling, stacking and tie-down provisions with stress ratings.
- f. Dimensional and weight data (gross and net)
- g. Bill-of-material
- h. Marking provisions including the center-of-gravity location
- i. For wheeled SDPE (self-powered or tractor/trailer) the overall length, width, and height with mounted item, turning radius, mobility, number of axles, unit contact load, number of tires, etc.
- j. Position and travel of adjustable wheels, titling, or other adjustments to facilitate loading.

3.1.3.2.4.15.3 Review the results of trade studies, engineering analyses, etc., to substantiate selected package/SDPE design approach, choice of materials, handling provisions, environmental features, etc.

3.1.3.2.4.15.4 Insure that package/SDPE design provides reasonable balance between cost and desired performance.

3.1.3.2.4.15.5 Review all preproduction test results of the prototype package design to insure that the HWCI is afforded the proper degree of protection.

3.1.3.2.4.15.6 Review Section 5, Packaging, of the HWCI Product Specification (deliverables as tech repts CDRL H00X), for correct format, accuracy and technical adequacy.

3.1.3.2.4.15.7 Review contractor procedures to assure that the requirements of Section 5, Preparation for Delivery of the approved HWCI Product Specification, will be incorporated into the package design data for provisioned spares.

3.1.3.2.4.16 System Allocation Document.

3.1.3.2.4.16.1 Review maintenance of the System Allocation Document since PDR.

3.1.3.2.4.16.2 Insure plans are initiated for configuration item re-allocations that may be necessary due to actions occurring prior to, or during, CDR.

3.1.3.2.4.17 Design Producibility and Manufacturing.

3.1.3.2.4.17.1 Review the status of all producibility (and productivity) efforts for cost and schedule considerations.

3.1.3.2.4.17.2 Review the status of efforts to resolve manufacturing concerns identified in previous technical reviews and their cost and schedule impact to the production program.

3.1.3.2.4.17.3 Review the status of Manufacturing Technology programs and other previously recommended actions to reduce cost, manufacturing risk and industrial base concerns.

3.1.3.2.4.17.4 Identify open manufacturing concerns that require additional direction/effort to minimize risk to the production program.

3.1.3.2.4.17.5 Review the status of manufacturing engineering efforts, tooling and test equipment demonstrations, proofing of new materials, processes, methods, and special tooling/test equipment.

3.1.3.2.4.17.6 Review the intended manufacturing management system and organization for the production program in order to show how their efforts will effect a smooth transition into production.

3.1.3.2.4.18 Post Review Action.

After completing the CDR, the contractor shall publish and distribute copies of Review minutes. The COR officially acknowledges and establishes the adequacy of the contractor's review performance by notification of:

- a. Approval -- to indicate that the review was satisfactorily completed.
- b. Contingent approval -- to indicate that the review is not considered accomplished until the satisfactorily completion of resultant action items.
- c. Disapproval -- to indicate that the review was seriously inadequate.

The CDR material shall provide a design disclosure with supporting analysis in sufficient detail to show the design is complete, meets the performance and functional requirements of the System 'A' Specification.

(CDRL A001: EIS/ Conference Agenda)

(CDRL A001: EIS/ Presentation Material)

(CDRL A001: EIS/ Conference Minutes)

3.1.3.2.5 System Verification Review

After successful completion of DT-II the contractor shall conduct a SVR to demonstrate that the total system (people, products, and processes) has been verified to satisfy requirements in the

documentation, and to confirm readiness for production, support, deployment, operations, and disposal. The contractor shall confirm:

- a. open issues and actions are resolved;
- b. system and subsystem test reports were complete and accurate;
- c. planning for production is complete.

The SVR shall assess the completeness of the PRM to ensure a smooth transition into the production phase of the program. The review shall demonstrate that issues found during testing have been addressed and the PRM shall meet all of the system requirements. The SVR shall also assess the transition to an efficient, cost-effective production-planning phase and shall verify completeness of all test reports and follow-on actions.

(CDRL A001: EIS/ Conference Agenda)

(CDRL A001: EIS/ Presentation Material)

(CDRL A001: EIS/ Conference Minutes)

3.1.4 Data Management

3.1.4.1 Data Repository / Tracking

The Contractor shall establish, maintain and control a current electronic documentation data bank that includes all documents received, generated and distributed under this SOW. Authorized Government representatives and their support contractors shall have access to the data contained in the data bank at all times.

3.1.4.2 Digital Data Management

The Contractor shall be responsible for the digital generation, reception and electronic delivery of data. All data shall be developed, managed, used, and delivered/exchanged electronically to the greatest extent practical. Communication via Electronic-Mail (e-mail) shall not relieve the Contractor of the responsibility to meet the contract requirements or change the contract requirements until the Contracting Officer issues a contract modification. The Contractor shall:

- a. Establish and maintain a current secure JLONS World Wide Web (www) page compatible with NAVEODTECHDIV www browser for the transmission of non-classified Contract Data Requirements List (CDRLs), e-mail and data generated in the performance of this contract. The www page shall be accessible by the authorized Government representatives and their support contractors. The interface to/from the www page shall deny access to the general public through the use of digital identifications.

- b. Ensure the JLONS www interface allows for the transmission of data via HTTP or FTP protocols using a variety of word processing, spreadsheet, scheduling, and database software compatible with that used by NAVEODTECHDIV.
- c. The Contractor shall maintain compatibility with the www browser, e-mail, and software used by NAVEODTECHDIV throughout the life of the contract.

3.1.4.3 Contractor Data Access

The Contractor shall establish and maintain internet e-mail capability, compatible with NAVEODTECHDIV (transmit and receive), within two (2) weeks after issuance of contract award. The Contractor shall send notification via e-mail to all CDRL addressees as applicable when the electronic data file(s) have been posted to the WWW. The Contractor shall distinguish among working data, submitted data and approved data. A list of files to be transmitted and which were transmitted electronically along with any procedures necessary for accessing them shall be included in the Contractor's Progress, Status and Management Report [ELIN Axxx].

3.1.4.4 Electronic CDRL Transmission

All unclassified CDRLs shall be delivered electronically and encrypted using software compatible with the NAVEODTECHDIV WWW browser. All electronic CDRLs shall be delivered as read only.

3.1.4.5 CDRL Delivery

CDRL items submitted electronically shall be considered delivered when they are successfully transmitted and received in accordance with paragraph 3.1.4.4 above. If deliveries to the Government are unreadable, the Government will notify the Contractor, and the Contractor shall correct any problems and re-send the CDRL. The Contractor shall only recognize comments received from the COR or the Contracting Officer. CDRL items not delivered electronically shall be delivered using best commercial practice.

3.1.5 Government Furnished Information

The Government Furnished Information (GFI) shall be managed in accordance with the provisions of this contract. Whenever possible the Government will deliver GFI in digital form to the Contractor. The Contractor shall inspect GFI within fifteen (15) days of receipt of the GFI and report any deficiencies within twenty (20) days after receipt of the GFI. [ELIN Axxx]. All requests for GFI shall include the specific information, the relevance and justification for the use of the GFI. The Government shall provide GFI within twenty (20) days of the request.

3.1.6 Government-Furnished Equipment (GFE)

The Contractor shall manage GFE in accordance with the provisions of this contract. The Contractor shall report [ELIN Axxx] to the Government any GFE found damaged, malfunctioning, or otherwise unsuitable for use.

3.1.7 Cost Schedule Status Reporting (CSSR)

The contractor shall establish, maintain and control a Cost Schedule Status Reporting (CSSR) Program. The contractor shall use its internal Government approved cost reporting system. The system should be designed to provide the MIPT the necessary management knowledge for planning and control of costs and schedule, including measurement of cost and schedule performance, identification of existing or potential problems, and plan of actions required to resolve the problems. As a part of this process, the Contractor shall generate a Funds and Man-Hour Expenditure Report [ELIN Axxx] for this SOW and an EVMS Report [ELIN Axxx].

(CDRL A001: EIS/ CSSR)

(CDRL A001: EIS/ Monthly Management Report)

3.2 Task 2 – System Engineering

The Contractor shall perform systems engineering tasks for the JLONS to meet the performance requirements of the JLONS Performance Specification. Any requested changes, deviations or waivers to the specification shall be submitted for approval in accordance with Appendix XX to the subject contract.

3.2.1 System Engineering Management

The Contractor shall provide systems engineering support to include system equipment development and interface integration, system level joint test activities, system certifications, technical reviews, IPT meetings and major meeting events support. This effort shall also include engineering support for system interface problem resolution.

3.2.1.1 Human Engineering Program

The contractor shall develop and implement a Human Engineering Program (HEP) to ensure that appropriate studies are performed and that human engineering criteria are applied to subsystem hardware and computer software design.

(CDRL A001: EIS/ HEP)

3.2.2 JLONS Development

The developer shall implement a systems engineering management process in accordance with a Systems Engineering Management Plan (SEMP) prepared to the instructions as described in MIL-STD-499B or an identified equivalent. The SEMP will define the necessary tasks and activities to be performed and shall include requirements analysis, functional analysis and allocation, and synthesis for the design of the system. The developer's system engineering process shall transform the requirements stipulated in the performance specification into a life cycle balanced set of products and process descriptions addressing the systems design, development, fabrication, test and evaluation, operational deployment, logistical support, personnel training, and final disposal. Where practical, system end-item requirements shall be met through the use of non-development items, when such products meet project needs, meet

mission operational and environmental requirements, and are cost effective over the entire cycle of the project. The developer shall generate and maintain a requirements verification and decision matrix to provide an audit trail from requirements of the System Performance Specification to design implementation and verification, including key decisions to meet the requirements.

The contractor shall conduct the necessary development and engineering activities, design and performance analyses, trade studies, investigations and requirements traceability to develop and demonstrate that the JLONS meet the applicable performance specifications.

The contractor's systems engineering process shall establish a proper balance between performance, risk, cost, and schedule.

The contractor shall ensure the compatibility, interoperability, and integration of all functional and physical interfaces, and it shall ensure that the system definition and design reflect the requirements for all system elements: hardware, software, facilities, people, and data products.

The contractor shall update and revise as required its System Engineering Management Plan (SEMP) specifically addressing the methodology to be utilized for the JLONS program.

Software development shall be an integral part of the system engineering effort and the plan to accomplish this shall be developed and maintained by the contractor in the EIS during the development phase.

(CDRL A002: EIS/ System Engineering Management Plan (SEMP))

(CDRL A002 EIS/ Software Process Implementation Plan)

3.2.2.1 System Analysis and Design

The contractor shall continue to perform engineering trade-offs and studies to meet the requirements of the JLONS performance specification.

The contractor shall provide an audit trail from the requirements of the JLONS performance specification to the implementation of its design to identify requirements verification and to document design decisions.

(CDRL A001: EIS / Technical Report - Trade Studies)

3.2.3 Configuration Management

The contractor shall update the CM plan submitted with the proposal. This plan shall outline the CM procedures to be followed to assure Configuration Status Accountability as the system evolves.

As a minimum the contractor's Configuration Management (CM) shall:

- ?? Assign and maintain serial numbers to the lowest replaceable units (LRUs) for the contractor produced assemblies. Purchased assemblies shall be identified by the vendor serial number;
- ?? Maintain Change Process and Deviations/Waiver numbering logs and the file of the originals.

(CDRL A002: EIS/ Configuration Management Plan)

3.2.3.1 Interface Control Documents (ICDs) and Interface Description Documents (IDDs).

The contractor shall establish, conduct, and co-chair with the Government a JLONS Interface Control PIPT. The contractor shall generate and maintain, Interface Control Documents (ICDs) and Interface Description Documents (IDDs) to the LRU level. The ICDs and IDD will identify space claims, weight, power requirements, and will define all necessary hardware and software interfaces for the JLONS. The ICDs and IDD shall address the capability for performance/growth margin.

3.2.3.2 Baseline(s)

Two (2) baselines shall be established in the Development Phase as the design and the documentation evolves from the detailed design phase configuration through the development phase configuration to the Production System. The baselines are as follows:

3.2.3.2.1 Preliminary Product Baseline (PPBL)

The PPBL shall identify the initial EDM phase configuration of the JLONS. The baseline shall be evolved from the baseline established in the SSD Phase. The PPBL shall be initiated at the start of the contract and shall be maintained until the Product Baseline (PBL) is established at CDR.

3.2.3.2.2 Product Baseline (PBL)

The PBL shall identify the production configuration, PRM. This baseline shall be established at System CDR. The PBL shall include the following:

- ?? Specifications;
- ?? Product Drawings
- ?? Commercial Drawings

(CDRL F00X)

3.2.3.3 Configuration Change Control

The contractor shall establish configuration change control. After the System Requirements Review, the contractor shall establish a Change Control Process under the function of the

SEPIPT. The SEPIPT shall assure changes to the PPBL/PBL, consider LCC, Production, Product Assurance, and logistic impacts.

After CDR approval, the contractor shall establish and chair a Configuration Control Board (CCB). The Government shall serve as a member of the CCB. The design layouts, detailed mechanical drawings and printed wiring board details shall be submitted to Configuration Manager and controlled by the CCB. The Navy Program Manager shall approve class I changes. Class I changes are those changes that impact the schedule, cost, form, fit or function of the system. Other changes should be considered class II changes, and shall be approved by the CCB.

3.2.3.4 Configuration Status Accounting (CSA)

The contractor shall maintain a history of all proposed changes, approved and unapproved. The contractor shall maintain an as built list and change incorporation history for the prototype system. The contractor shall maintain the configuration status accounting (CSA) report with periodic updates.

(CDRL A001: EIS/ Quarterly CSA Report)

3.2.4 Technical Data Package

The contractor shall develop and maintain a Technical Data Package (TDP), which details the complete product design and definition for the JLONS. The TDP shall provide the data necessary for the contractor to fabricate, inspect and test hardware and software identical to that produced under this contract as final products.

(CDRL A002: /EIS JLONS Prime Item Development Specification)

(CDRL A001: /EIS Configuration Item Product Development Specification)

(CDRL A001: /EIS Software Product Specification)

(CDRL A003 Developmental Design Drawings and Associated Lists)

(CDRL A004 Commercial Drawings and Associated Lists)

3.2.4.1 Non-Development Items

If the Contractor proposes the use of a Non-Development Item (NDI), as defined in EIA/IS-G32, the supporting documentation shall be submitted to the Government for review and approval. NDI requirements analyses shall include, but are not limited to: safety certification, technical manual detail, and life-cycle supportability. The conclusions of all such analyses shall be presented to the SE PIPT.

3.2.4.2 NDI Licenses

The Contractor shall be responsible for the procurement of all hardware and software licenses for non-GFE NDI products delivered in this contract including both contractor developed and third-party NDI. If the Contractor needs to obtain a license for any NDI incorporated into a deliverable under this contract, the Contractor shall notify the Government immediately and in writing. This notification shall specify whether the license(s) that needs to be procured are transferable to the Government and/or any of its other contractors. These licenses shall be transferred to the Government in accordance with the technical data clauses in Section I of the contract. The licenses shall be of the appropriate scope to allow the Government to develop, maintain, use, release, disclose, and support (including updates and modifications) the deliverable throughout the life cycle of the product.

3.2.4.3 Vendor Proprietary Information

The Contractor shall deliver to the Government all documentation, drawings, source code or other items developed under this SOW to meet the performance requirements of the Performance Specification. The documentation package shall be provided as a Technical Report [ELIN Axxx] thirty (30) days prior to the PDR, CDR and PRM delivery. The Government may request specific data packages as discussed at the SE PIPT meetings.

3.2.4.4 Engineering Documentation and Drawings

After the Physical Configuration Audit (PCA), the JLONS drawing tree reflecting the current design of record shall be delivered to the Government in MS EXCEL format. Engineering documentation and drawings shall also be delivered in their native electronic form and in pdf on CD-ROM [ELINS Axxx, Axxx, and Axxx]. Engineering notices shall be sent to the COR as they are released.

3.2.5 Problem Report System

The Contractor shall establish a single system for the identification, tracking, and resolution of all hardware, software and baseline documentation problems identified during design, development, integration and testing. In addition, a Problem Report (PR) system shall be used to track test documentation problems and technical manual errors. Data on the problems covered in this system shall be available on the JLONS WWW home page and included with the Contractor's Progress, Status and Management Report [ELIN Axxx].

3.2.6 ELECTROSTATIC DISCHARGE PROTECTION

When components sensitive to Electrostatic Discharge (ESD) are utilized, the Contractor shall follow the ESD procedures identified in the Performance Specification. All ESD sensitive items shall be marked in accordance with MIL-STD-xxxx.

3.3 Task 3 – SOFTWARE/FIRMWARE DEVELOPMENT

Software shall be developed in accordance with MIL-STD-498. This process shall be applicable to the definition, design, generation, documentation, and testing of all software and firmware

items developed and/or upgraded under the contract. Unless specifically defined otherwise herein, all terms used in the software development effort are defined in accordance with MIL-STD-498.

3.3.1 Software Development Requirements - Not Used

3.3.2 Software Development Plan - Not Used

3.3.3 Software Design Requirements

The Contractor shall develop Interface Requirements Specifications (IRSs) [ELIN Axxx] and a System/Subsystem Design document [ELIN Axxx] for all CSCIs developed under this contract. PDR and CDR packages shall be acceptable as the System/Subsystem Design Document submittal [ELIN Axxx]. This includes the requirements outlined the subparagraphs below.

3.3.3.1 Software Design Documents

The Contractor shall develop the following documents in accordance with MIL-STD-498:

- a. Interface Design Description (IDD) [ELIN Axxx]
- b. Validation and Verification Plan (V&VP) [ELIN Axxx]
- c. Test / Results Validation [ELIN Axxx]

3.3.3.2 Software Development Files - Not Used

3.3.3.3 Interim Software Deliveries - Not Used

3.3.3.4 Program Package - Not Used

3.3.3.5 Software Development Facilities

The Contractor shall be responsible for providing complete facilities to support the software development effort, including full responsibility for facilities, equipment, regeneration and operation, as required.

3.3.4 Computer Software Operation - Not Used

3.3.5 Support Software Requirements - Not Used

3.4 Task 4 – PARTS MANAGEMENT

Using MIL-HDBK-965 for guidance, the Contractor shall select parts and conduct a parts management program that assures the JLONS meets the Performance Specification requirements with the lowest life cycle cost.

3.4.1 Parts Selection

The contractor shall prepare a Program Parts Selection List (PPSL) for Government approval [ELIN Axxx].

3.4.2 Diminishing Manufacturing Sources (DMS)

The Contractor shall review, through the period of performance of the contract, the Government/Industry Data Exchange Program (GIDEP) DM5 notices and other supplier notifications for applicability to the JLONS hardware being delivered.

3.5 Task 5 – SAFETY ENGINEERING

The Contractor shall establish and maintain a JLONS system safety program. The Contractor shall:

- ?? Participate in the Safety PIPT
- ?? Develop and update inputs to the safety program hazard analyses
- ?? Provide input, status and resolution into the safety risk management database
- ?? Ensure overall system safety requirements identified as identified by the Contractor and the Safety PIPT are adequately addressed.

Unmitigated hazards with a severity category of I and II (defined in paragraph 4.5.1 of MIL-STD-882) are not authorized in the equipment design. The Contractor shall provide specific definitions for hazard probability levels A through E (discussed in paragraph 4.5.2 of MIL-STD-882).

The Contractor shall actively participate in the following analyses by providing hazard analysis inputs as defined in the JLONS System Safety Program Plan (SSPP), Attachment x to the SOW;

- ?? Task 106, Hazard Tracking and Risk Resolution
- ?? Task 203, Preliminary Hazard Analysis (PHA)
- ?? Task 204, Subsystem Hazard Analysis (SSHA)
- ?? Task 205, System Hazard Analysis (SHA)

The Contractor shall conduct an Operating and Support Hazard Analysis (O&SHA) (Task 206) [ELIN Axxx].

All safety and hazard analyses shall include non-developmental items and Government-furnished equipment, if any. The results of the O&SHA shall be presented, in Contractor format, at the Critical Design Review. Hazard probability levels A through D shall be reported.

3.5.1 Hazardous Materials Management Program (HMMP)

The Contractor shall identify hazardous materials (if any) required for operation and support, and conduct trade-off analysis on such materials in accordance with sections xx of xxxx [ELIN Axxx].

3.6 Task 6 - TEST AND EVALUATION REQUIREMENTS

3.6.1 T&E Program Plan

The Contractor shall implement a T&E program. The Contractor shall develop and maintain a Test and Evaluation Program Plan (TEPP) [ELIN Bxxx] to document the T&E program and to demonstrate compliance with all requirements of the Performance Specification. The TEPP shall address the following:

- a. All test activities, phases, locations and responsibility for system hardware and software components.
- b. Entrance and exit criteria for all tests;
- c. Government participation in the test program;
- d. The approach for use of Government-furnished assets and facilities for acceptance of the tactical systems;
- e. Test Master Schedule;
- f. How test failures will be documented and reported;

3.6.2 Test And Evaluation Management

The Contractor shall manage the T&E program in accordance with the approved TEPP and this SOW. Changes proposed to correct test deficiencies shall be submitted in accordance with Appendix x of the contract SOW.

3.6.2.1 Test Reporting

The Contractor shall present detailed progress of testing to date and projections for near term three (3) month activities at the SE PIPT meetings. These presentations shall include test activity for production hardware, firmware and software deliveries, test support, Government Furnished Property (GFP), and significant problems affecting test progress.

3.6.2.2 Documentation Review Coordination

A summary of test documentation status shall be presented by the Contractor at each SE PIPT meeting and all Quarterly Reviews.

3.6.2.3 Problem Report

The Contractor shall identify and document problems that arise during test and evaluation in the Problem Report (PR) system. The SE PIPT will classify appropriate PR severity, establish correction priorities, approve PR status changes, and determine PR regression test requirements.

3.6.3 Test Requirements

The Contractor shall develop a Test Requirement Document (TRD) [ELIN Bxxx] for each test identified in Section 3.6.4 below. The T&E PIPT will review the TRD and provide technical approval. The Contractor shall submit a final TRD upon incorporation of the red-lines to the Contracting Officer's Representative (COR) for approval. An email notice to the COR shall be provided by the contractor prior to the orders of all tests.

3.6.3.1 Specification Requirements Verification Matrix

The Contractor shall prepare a Specification Requirements Verification Matrix (SRVM) [ELIN Bxxx]. The SRVM shall be prepared and maintained to ensure traceability of all Specification requirements.

3.6.3.2 Test Procedures

The Contractor shall develop Test Procedures (TP) [ELIN Bxxx] for the tests identified in paragraph 3.6.4. All test procedures shall be submitted to the T&E PIPT for review and comment. After comment adjudication and incorporation, the test can be conducted. The T&E PIPT shall designate which tests the Government representative(s) will witness. The test procedure will be reviewed and red-lined by the Contractor and counter-signed by the Government representative concurrent with the test conduct. The test procedure will be signed off and approved of the test. The contractor shall incorporate any redlines into the test procedure and submit to the COR for approval. If the Contractor proposes qualification or partial qualification of an item by either analysis or by similarity to another item developed under commercial standards or prior Government programs, a detailed justification shall be provided. Judgment of justification adequacy shall be performed by the SE PIPT.

3.6.3.3 Test Reports

The Contractor shall generate and submit a Test/Inspection Report [ELIN Bxxx] following the conduct of each test.

3.6.4 Tests

The Contractor shall conduct risk reduction and performance validation tests as defined in the TEPP and SRVM.

3.6.5 Follow-On Navy Testing

3.7 Task 7 – Reliability Engineering

The Contractor shall implement and, maintain a reliability program to ensure that specified reliability requirements are met. The Contractor shall present the status of his reliability program elements at program and technical reviews. MIL-STD-725 may be used as guidance in meeting the reliability requirements defined in this SOW.

3.7.1 Reliability Program Plan

The Contractor shall develop a Reliability Program Plan [ELIN Cxxx] defining the reliability effort for this contract. The Reliability Program Plan shall address all reliability tasks, development schedules, parts/components selection criteria, reliability predictions, failure analysis, design review results, and testing. The Reliability Program Plan shall also outline the procedures and methods for meeting the engineering and technical task performance requirements of this contract.

3.7.2 Failure Summary and Analysis Report.

The Contractor shall submit a Failure Summary and Analysis Report [ELIN Cxxx]. The SE PIPT shall review functional/performance failure data from inspections and tests. Failure data including a description of test conditions at the time of failure, symptoms of failure, failure isolation procedures, and known or suspected causes of failure shall be reviewed and corrective action initiated by the SE PIPT. The Contractor shall incorporate failure analysis and reporting in the Problem Report system described in section xx of the SOW.

3.7.3 Reliability Modeling and Allocations

The Contractor shall develop and maintain Reliability Models and Block Diagrams [ELIN Axxx] based on LRUs, critical components, software, equipment and system functions. The Contractor shall use the models and block diagrams to allocate higher-level reliability requirements down to the equipment, LRU and software levels for use in the selection of NDI. Reliability block diagrams shall be keyed and traceable, including nomenclature, to functional block diagrams, schematics, and drawings, to provide the basis for mathematical representation of reliability. The reliability mathematical model shall be relevant to test changes in item configuration, mission parameters and operational constraints. Modeling techniques shall provide basic/mission reliability for equipment and software; and mission reliability of the system. The models/allocations shall be executed using a software package as agreed upon in the SE PIPT.

3.7.4 Reliability Predictions

The Contractor shall provide basic and mission reliability predictions [ELIN Axxx], MIL-HDBK-217 may be used as guidance by the Contractor in preparing the predictions. These predictions shall be made using reliability block diagrams and failure rate data. Predictions shall be compared to allocations and deficiencies identified by the Contractor. The Contractor shall choose the method of reliability prediction appropriate for electronic equipment and software operating in an operational environment. When reliability predictions are not available for NDI,

the Contractor shall propose a prediction methodology that includes analysis, historical data and testing. The prediction methodology shall be subject to approval by the SE PIPT. The Contractor shall use a method of reliability prediction for the mechanical and optics components of the JLONS appropriate to mechanical and optical system wear and shall be subject to approval by the SE PIPT.

3.8 Task 8 – INTEGRATED LOGISTIC SUPPORT

The Contractor shall establish and maintain an ILS program for the JLONS Program. The objective of this ILS program is to ensure that all hardware and software products, including all Non-Developmental Items (NDI), modified NDI, and newly developed items delivered under this SOW are fully supported throughout their life cycle.

3.8.1 ILS Planning and Management Requirements

The Contractor shall integrate and manage all contractor logistics support resources to satisfy the overall objectives of the requirements contained herein. The Contractor shall designate an ILS Manager who shall have responsibility for all logistics aspects of this contract. All logistics related activities included in this SOW, shall be governed by the management requirements specified in paragraph xx. To the maximum extent feasible, common logistic support products and concepts utilized by NAVEODTECHDIV shall be applied to the JLONS.

3.8.1.1 ILS Reviews

The Contractor shall support periodic ILS reviews at the ILS PIPT meetings. The Contractor shall present the ILS Program status and discuss topics related to ILS Program planning and implementation of contract ILS requirements. The Contractor shall issue the meeting minutes [ELIN Axxx] and assist in maintaining the action item list as required.

3.8.1.2 Program Planning

The contractor shall develop a support program for the JLONS that supports the objectives outlined in the JLONS Support Strategy, Attachment (x). The contractor shall develop and update the ILS program plans and concepts as required based on analysis results, program schedule modifications, and project decisions.

The Contractor shall develop and maintain an ILS Master Schedule [ELIN Dxxx]. As the program matures, the Contractor shall present any requests for change to the ILS Master Schedule [ELIN Dxxx] to the ILS PIPT. Any changes to the ILS Master Schedule [ELIN Dxxx] shall not affect the required delivery dates of the end item nor its support.

The contractor shall utilize the performance specifications and functional requirements for the JLONS in the development of ILS program plans. The contractor shall also factor in impacts of expected project funding and schedule constraints and other known key resource constraints that would impact support of the equipment such as projected deficits in numbers or skills of available personnel, limited priorities on strategic materiel, etc.

The contractor shall develop the following JLONS Logistic Program Documents:

?? Integrated Logistics Support Plan (ILSP) [ELIN Dxxx]

?? ILS Master Schedule (Provided during ILS IPT) [ELIN Dxxx]

The JLONS ILS program documents shall define the organizations, relationships, concepts, approaches, processes and program procedures to be used in the development of support materials and documentation for the JLONS. These documents shall be the basis for life cycle support efforts.

3.8.2 Supportability Analyses Program

3.8.2.1 Supportability Analysis (SA) Process

The Contractor shall implement a tailored Supportability Analyses (SA) process for JLONS using MIL-PRF-49506 and MIL-HDBK-502 as guidance. The SA process shall form the basis for documenting and implementing decisions concerning how to cost-effectively support the system over its entire life cycle. The SA process shall support acquisition logistics planning, level of repair and reliability-centered maintenance decisions, program and Performance Based Logistics (PBL) tradeoffs, and the formation of contract provisions. The following tasks shall be accomplished:

3.8.2.1.1 SA Plan

The contractor shall document in the ILSP [ELIN Dxxx] a SA Plan that defines the analyses to be performed; identifies the anticipated deliverables and their proposed schedule; describes the development, maintenance, use, and access to the SA database; and explains how program reviews and In-Process Reviews (IPRs) will ensure that all data and equipment needed for the life cycle support of the system is provided to the government. The plan shall include the establishment of a common SA database that will provide standard data on all JLONS items and use existing failure data and analyses from Baseline Comparison Systems (BCS), as available, to minimize effort and cost. Government access to the SA database will be via appropriate agreed-upon electronic data exchange methods.

3.8.2.1.2 Guidance Conference

The Contractor shall host a joint Government/Contractor Guidance Conference to establish Government/Contractor interfaces and finalize the analysis tailoring within sixty (60) days after contract award. Agreements reached during the conference shall be documented in meeting minutes issued by the Contractor [ELIN Axxx] and included in the ILSP [ELIN Dxxx]. The Contractor shall coordinate the Guidance Conference meeting minutes [ELIN Axxx] with ILS PIPT members, revise the minutes as necessary, and obtain NAVEODTECHDIV concurrence prior to official release. SA reviews will be held as part of the ILS PIPT.

3.8.2.1.3 SA In-Process Reviews (IPRs)

The SA IPRs shall be held during ILS PIPT Meetings. The Contractor shall make available appropriate documentation, hardware and personnel for these reviews, as required.

3.8.2.2 Task Analysis

The Contractor shall identify and document supportability factors, characteristics and supportability constraints. Supportability factors include qualitative supportability issues, cost and readiness drivers, unique system drivers, risks and assumptions. The recommendations shall be documented in the Supportability Factors Report [ELIN Axxx]. Prior to CDR, final recommendations shall be documented in the ILSP [ELIN Dxxx].

The Contractor shall identify requirements and proposed solutions for the supportability of the JLONS to include:

- ?? Readiness
- ?? Design Trade-Offs
- ?? Technical Data
- ?? Manpower and Personnel impacts (Afloat, Ashore and Contractor)
- ?? Training Trade-Offs
- ?? Level Of Repair Analysis (LORA)
- ?? Transportability
- ?? Supply support
- ?? Facilities
- ?? Life Cycle Cost (Operation and Support)

The Contractor shall identify the operational and maintenance task requirements for the JLONS. Task descriptions shall include manpower requirements, estimated part sources and requirements, test equipment requirements, tool requirements, Special Purpose Support and Test Equipment (SPS&TE) and estimated schedule budgets. The Contractor shall also identify environmental impact of the tasks including, use of hazardous materials, generation of hazardous waste and release of air and water pollutants. These task descriptions and analysis results shall be documented in the SA database, when applicable, and data shall be updated to reflect current change status.

The Contractor shall identify and document support resources. These resources include SPS&TE, facilities, training, and operational impacts. These support resources shall be delivered in the support resources report [ELIN Dxxx], new and critical support resources will be specifically identified in the report.

The Contractor shall develop and maintain a critical items list [ELIN Dxxx]. This critical items list shall include single point of failure items, Maintenance Significant Items (MSIs), items sensitive or susceptible to market conditions and items that are long lead procurement items.

3.8.2.3 Reference Designator Structure

The Contractor shall use a reference designator structure for the SA database that represents a top down breakdown disassembly of the system into its functional systems, subsystem, components/ assemblies and parts. All LRUs and MSIs within the LRUs shall be separately identified in the SA database.

3.8.2.4 SA Database

The cornerstone of the SA database shall be initialized as presented during the JLONS PDR. As the design matures, the contractor shall update the database to reflect the current design. At CDR, the SA database shall reflect the design as presented. In addition to the Contractor part numbers and drawing numbers identified on these bills of material, the vendor drawing numbers and part numbers for all purchased parts cited on these bills of materials are required. At a minimum, the SA data elements listed below shall be stored and maintained in the SA database and included in all material procurements, when applicable and available. If data isn't available the Contractor shall contact the Program Office. SA database reports shall be provided to the ILS PIPT, and the status shall be presented at the ILS reviews and the Quarterly reviews.

1. System/end item operations and maintenance requirements
 - a. End item reference designator
 - b. End item indenture code
 - c. End item name
 - d. End item part number
 - e. Technical manual (TM) number
 - f. Required maximum time to repair
 - g. Required mean time to repair (MTTR)
 - h. Required mean time between failure (MTBF)
2. Item configuration, reliability and maintainability data (LRUs)
 - a. Reference designator
 - b. Indenture code
 - c. Part number
 - d. Item drawing number
 - e. Item drawing number revision

- f. Item name
 - g. Technical manual (TM) number
 - h. Line replaceable unit (LRU)
 - i. Item function
 - j. Maintenance concept
 - k. Maintenance replacement rate (MRRI)
 - l. Repair cycle time (RCT)
 - m. MTBF Maintenance action code (MAC)
3. Task analysis data (LRUs)
- a. Reference designator
 - b. Indenture code
 - c. Maintenance action code (MAC)
 - d. Task identification
 - e. Measured mean elapsed time
 - f. Predicted mean elapsed time
 - g. Task requirement reference designator
 - h. Task type, Preventative (P), Corrective (C), or Operation (O)
 - i. Means of detection
 - j. Task support equipment
 - k. Task support equipment item quantity
 - l. Task support equipment full item name
4. Supply support—Mandatory (LRUs)
- a. Reference number (part number)
 - b. Manufacturer Contractor and government entity (CAGE) code
 - c. Item name (part name)

- d. Maintenance Replace Rate (MRR)
- e. Quantity per assembly
- f. Quantity per end item
- g. Source, Maintenance and Recoverability (SM&R) Code
- h. Unit of Issue (U/I) Price
- i. Production Lead Time (PLT)
- j. Manufacturer Name
- k. Shelf Life
- l. Shelf Life Action
- m. Precious Metal Indicator Code (PMIC)
- n. Repair Return Mode
- o. Controlled Item Inventory Code (CIIC)
- p. Type of Storage
- q. Issue Restriction Code
- r. Special Material Content Code (SMCC)
- s. Demilitarization Code
- t. Movement Priority Designator
- u. Designated Overhaul Point Cage
- v. Additional Designated Overhaul Point Cage(s)
- w. Material Manager

The results of SA analysis shall be stored and maintained in a common logistics relational database per MIL-PRF-49506 and using MIL-HDBK-502 for guidance. Additional guidance regarding data element, report format, report distribution, and report frequency requirements will be provided by the ILS PIPT. Specific SA database technical reports [ELIN Axxx] shall be provided electronically as required by the approved ILS Master Schedule [ELIN Axxx]. The ILS PIPT may identify additional SA database report requirements to be delivered as Technical Reports [ELIN Axxx].

3.8.3 MAINTENANCE PLANNING REQUIREMENTS

The Contractor shall implement and maintain a maintenance program to support the JLONS. The Contractor shall perform an evaluation of all maintenance requirements and recommend any changes or improvements to the Government before implementing the maintenance program.

3.8.3.1 Maintenance Concepts

The objective of the JLONS maintenance concept is to maintain a stable, highly reliable condition of material readiness. To achieve this, the JLONS design shall reflect the following supportability goals:

- ?? Leverage upon existing NAVEODTECHDIV logistic infrastructure
- ?? Reduce logistics cycle time at all levels of maintenance
- ?? Implement a seamless logistics system through continuous acquisition and life cycle support (CALS) process
- ?? Establish lean inventory control processes without undermining maintenance response time.
- ?? Minimize total logistic support costs

Where existing equipment is not compatible with the maintenance concept or the requirements stated herein, the Contractor shall report these discrepancies and a determination will be made by the Government as to necessary equipment and/or support modifications.

3.8.3.2 Levels of Maintenance

Maintenance planning shall address two levels of maintenance:

Organization Level (O-Level) and Depot Level (D-Level)

3.8.3.3 Level of Repair Analysis (LORA)

The Contractor shall perform, maintain, and update the LORA on all newly developed, new acquisition (including COTS/NDI) and modified equipment and lower level LRUs, using NAVSEA TL081-AB-PRO-010/LORA and MIL-STD-1390D for guidance. The LORA results [ELIN Axxx] shall be stored and maintained current in the SA database and presented to the government at ILS/IPT meetings.

3.8.3.4 Lowest Replaceable Unit (LRU)

The Contractor shall prepare and maintain a list of recommended O-Level LRUs for all new and modified equipment [ELIN Axxx]. The LRU recommendations shall include assumptions, justifications and a preliminary list of items recommended for consideration as LRUs. This LRU list shall be stored and maintained in the SA database.

The contractor shall prepare and maintain a list [ELIN Axxx] of parts used to perform depot repair on each JLONS LRU. The initial quantities recommended shall be selected to support a repair turnaround time of 2 weeks assuming the LRU failure rates determined through analysis and an operational JLONS population of x. This list shall be stored in the SA database and periodically reviewed at IPRs. The information contained on these part listings shall include:

?? LRU Name

?? LRU Part Number

?? Repair Part Name

?? Repair Part Number

?? Repair Part Quantity per LRU Part Number

?? Repair Part Manufacturer CAGE

?? Repair Part Unit Price

?? Repair Part Procurement Lead Time (Weeks)

?? Repair Part Probability of Use (Replacement Rate) per LRU Part Number Repair

?? Repair Part Type (Repairable, Expendable, or Consumable)

3.8.3.5 Maintenance Data/Documentation

The Contractor shall develop and maintain maintenance planning data/documentation to establish maintenance requirements, periodicity's, and maintenance and repair procedures for the JLONS based upon RCM analysis.

The Contractor shall recommend maintenance documentation (maintenance and repair procedures) that should be used as-is, used with modification or developed new. D-level repair procedures may be delivered in contractor format [ELIN Gxxx].

3.8.4 SUPPLY SUPPORT

The Contractor shall assist the Government in provisioning spares, repair parts and support material for each level of maintenance as described below.

3.8.4.1 Interim Support

3.8.4.2 Interim Support Planning

The Contractor shall develop and maintain an interim support plan that documents how the contractor will provide spares support until end items are transitioned to the Life Cycle Support Contractor (LCSC). Interim spares support includes O-Level initial outfitting and replenishment,

and D-Level initial outfitting and replenishment. The interim support process used to order and deliver spares shall support O-Level and D-Level initial outfitting schedules and maintain approved replenishment levels at these sites. The plan shall describe the Contractor's organization, operating policies, procedures and management review of interim support process including coordination and assistance required from the Government. The Contractor's plan shall provide the Contractor's approach to transition to the LCSC, depot support and the resolution of DMS issues. The interim support plan shall be a part of the ILSP [ELIN Dxxxxl].

3.8.4.3 Spares Listing

The Contractor shall develop, recommend, and update a list [ELIN Axxx] of O-Level and D-Level consumable material. The listing shall include expendable material and all associated material to support repair and maintenance at the O-Level. The quantity of material recommended shall be sufficient to maintain a repair turnaround time per the Performance Specification. The initial quantities shall be sufficient to support the JLONS for one year based on established failure rates and maintenance requirements. The format and content of the list [ELIN Axxx] shall be presented to and accepted by the JLONS ILS PIPT.

3.8.5 Transition to Life Cycle Support Contractor

The contractor will complete actions assigned during ILS PIPT meetings related to establishing and maintaining a set of requirements that must be satisfied in order to activate a LCSC.

3.8.6 Provisioning Requirements

Provisioning data in the SA database shall be updated to reflect design and engineering changes, as well as observed changes in predicted failure rates, contractor turnaround times, production lead times, maintenance task distribution and unit price.

3.8.6.1 Provisioning Technical Documentation (PTD)

The Contractor shall use information contained in the SA Database to develop and maintain PTD for the JLONS. The Contractor shall submit PTD [ELIN Axxx] for the following hardware items:

- ?? JLONS;
- ?? JLONS Sub-Systems;
- ?? JLONS LRUs
- ?? JLONS Installation Materials
- ?? JLONS Support and Test Equipment.

The PTD submissions [ELIN Axxx] for the hardware items cited above shall include the Contractor Furnished and Government Furnished PTD data elements as identified in section 3.8.2.4 of this SOW.

PTD submissions [ELIN Axxx] shall be reviewed and accepted at ILS PIPT meetings. Modifications to the above list will be made, if necessary during ILS PIPT meetings. The PTD submissions shall be in MS Excel 97 format. One MS Excel spreadsheet with a single line entry for each hardware item cited above is acceptable. A drawing and parts list shall be provided for each item listed on the submission. The GFI applicable to each item provisioned will be provided during the ILS/IPT meeting. The Contractor will update the PTD submission as directed during the ILS PIPT and forward the updated PTD electronically to all IPT members. NAVEODTECHDIV will coordinate these submissions [ELIN Axxx] with the cognizant activities for review and/or action.

3.8.7 Depot Spares

The Contractor may be requested to stock, assemble and replenish D-Level spares, expendables, and D-Level repair support material. The contractor shall maintain depot stock inventory needed to support these requirements. The Government may place orders for the manufacture or procurement of additional items or additional depth for existing items or both.

3.8.8 SUPPORT AND TEST EQUIPMENT

The Contractor shall identify and document D-Level support and test equipment for the JLONS based on the operation and maintenance requirements determined as a part of the SA process. Support and test equipment identified shall consider scheduled and unscheduled maintenance at each maintenance level.

The Contractor shall minimize the number of different types of support equipment. The S&TE shall be identified in the SA database and the ILSP.

3.8.8.1 General Purpose Electronic Test Equipment (GPETE)

The design and support goal is to rely on automated diagnostics to identify and localize problems and to eliminate the need for Special Purpose Support and Test Equipment (SPS&TE) at the O- and D-Levels of maintenance. The Contractor shall use TOOLS OSSC-0001 and NAVSEA ST000-AA-IDX--010-PEETE for guidance in the selection of GPETE.

3.8.9 Special Purpose Support and Test Equipment (SPS&TE)

Tools and test equipment not from sources cited in paragraph 3.8.8.1 shall be classified as SPS&TE and shall not be used unless a request for use is submitted to and approved by the Government. the SPS&TE request shall include the following:

- ?? description of the prime system/equipment to be supported;
- ?? description of the SPS&TE;
- ?? whether SPS&TE is portable or permanently installed;
- ?? the type and level(s) of maintenance for which the SPS&TE is required, with a listing of the Technical Manual(s) that contain(s) the maintenance procedure(s)

- ?? description of Electromagnetic Interference restrictions;
- ?? temperature ranges for operation and storage;
- ?? any additional environmental restrictions;
- ?? calibration requirements and available calibration procedures;
- ?? define support requirements for the SPS&TE item;
- ?? estimated cost of the item and its associated support items; and projected total cost to outfit all locations that will need the SPS&TE item.

The Contractor shall deliver a list [ELIN Axxx] of SPS&TE needed for operation and D-Level maintenance of the JLONS as part of this SOW. This list shall be maintained throughout the period of performance. The Contractor shall provide Level II drawings with vendor part numbers, including recommended sources, and all additional engineering documentation [ELINS Axxx, Axxx, Axxx] required to procure the SPS&TE and repair parts for the SPS&TE, should the SPS&TE be approved by the Government for use.

3.8.10 PACKAGING, HANDLING, STORAGE AND TRANSPORTATION

The Contractor shall establish a Packaging, Handling, Storage and Transportation (PHS&T) program that utilizes existing PHS&T programs to the maximum extent possible. The PHS&T program shall prevent both damage to the material and physical harm to personnel and shall not adversely affect the material operating characteristics. The Contractor shall provide recommendations for resolutions to any PHS&T problem areas beyond his control. The Contractor shall identify all PHS&T requirements including but not limited to: (1) single mode of delivery, (2) special packaging, (3) technical escorts, (4) unique handling devices, (5) environmental control and emergency procedures, and (6) preventive maintenance during storage or inactivation. These requirements shall be addressed in the ILSP and the SA database.

The Contractor shall be responsible for all preservation, packaging, marking, handling, storage and transportation for hardware/software and associated materials. The Contractor shall perform all of the packaging and delivery functions necessary to ensure on-time delivery for all materials.

3.8.10.1 Special Containers

The Contractor shall query the DoD system for available containers that satisfy the requirements and use existing containers to the maximum extent possible. The results of the contractors query shall be documented in the ILSP. In the event, that special containers are required, the Contractor shall design containers in accordance with best commercial practices. The Contractor shall use reusable containers to the maximum extent practical and economical.

3.8.10.2 Preservation, Packaging, Packing and Marking

Requirements for preservation, packaging and packing of the subsystem hardware and spares/repair parts shall be determined through the Contractor's PHS&T program. Existing preservation, packaging and packing methods shall be used to the maximum extent possible.

3.8.11 TRAINING PROGRAM REQUIREMENTS

The Contractor shall develop and maintain JLONS operations and trouble shooting technical information [ELIN Axxx] . This technical information will be reviewed by the JLONS ILS PIPT and forwarded to NAVEODTECHDIV. NAVEODTECHDIV will use this technical information to update, if required, the EOD organizational level curricula. The technical information [ELIN Axxx] developed under this SOW shall reflect the JLONS production configuration.

3.8.11.1 Curriculum Development The amount of time expected to train system operational use to an EOD technician with existing skill levels has a threshold set at 5 days or less, with an established objective set at two and a half days. These training times shall include the required laser safety brief as a part of the curriculum.

The contractor shall develop and maintain initial JLONS training materials using best commercial practices [ELIN Axxx].

3.8.11.2 Training Conduct Requirement

The contractor will prepare for and conduct one JLONS training course at their facility using production representative hardware, software and logistics products. The contractor shall provide all necessary classroom and laboratory material and facilities to support training for the period of this conduct.

3.8.12 TECHNICAL MANUALS

The Contractor shall establish and document a Technical Manual (TM) program to plan and manage the development, validation, verification, delivery, and update all technical information needed to effectively operate and maintain the JLONS and associated test equipment hardware and software throughout its life cycle. The technical manual program shall be documented as part of the ILSP. TMs shall be prepared in accordance with Technical Manual Contract Requirements TMCR NO. NDMS-xxxxxxx-xxx-xxxx for new manuals. The contractor shall submit technical data to NAVEODTECHDIV who will generate changes to existing technical manuals, procedures and utilize the technical data to generate an Interactive Electronic Technical Manual (IETM).

The status of all Technical Manual information development, validation, verification, delivery, and update shall be provided in the Contractor's Progress and Status Report [ELIN Axxx]. Technical data information cost and schedule status shall be provided in the Contractor's Funds and Man-Hour Expenditure Report [ELIN Axxx], as applicable.

3.8.12.1 Technical Information Validation/Verification

The Contractor shall provide and maintain a Validation/Verification Plan as part of the ILSP [ELIN Dxxx] and shall support joint validation and verification with the Government. A Verification Sequence Control Chart shall be provided as an appendix.

3.8.12.2 Technical Information/Data Deliveries

The Contractor shall provide interim technical information deliveries [ELIN Gxxx] for Government review at increments specified in the approved ILS Plan milestone schedule. Prior to the submission of any interim deliveries, the Contractor shall present a technical data outline for discussion and acceptance at a ILS PIPT meeting. Interim and final deliveries of the technical information [ELIN Gxxx] will be made per the approved ILS Plan milestone schedule. The content requirements of the technical information package shall be established in the ILSP [ELIN Dxxx].

3.8.12.3 Interactive Electronic Technical Manuals (IETMs)

The final format of the IETM will be produced by the government using electronic SGML based technical data delivered by the contractor [ELIN Gxxx].

4.0 Government Furnished Resources

The Government shall also provide no-cost use of the following facilities for use in fulfillment of the requirements of this contract SOW:

- a. TBD
- b. TBD

5.0 INSPECTION AND ACCEPTANCE

Inspection and acceptance of the operationally suitable hardware deliverables (identified in paragraphs xx and xx of this SOW) shall be made at source by the Procuring Contracting Officer's Representative or a designated representative of the Government. Inspection and acceptance of all data deliverables shall be as prescribed in the individual Exhibits. Successful completion of all testing outlined in the SRVM shall define final acceptance of an operationally acceptable JLONS. Acceptance shall occur via a DD250.

6.0 DELIVERABLES

The contractor shall deliver the data, hardware and engineering support as outlined herein and identified in the integrated program schedule.

6.1 Data

Over this period of performance, the contractor shall provide Contract Data Requirements List (CDRL) items as identified in Attachment (x)

CDRL deliveries are to be delivered electronically with copies to the following:

NAVEODTECHDIV = e-mail: xxxxx@xxxxx.xxxxxx.mil

6.2 Hardware

After successful completion of the Navy approved test program, the contractor shall deliver to the Government two EDMs after PDR and two PRMs after CDR that meet the JLONS Performance Specification requirements.

6.3 Special Tooling & Test Equipment

The contractor shall provide any special tooling and test equipment utilized in the fabrication of the JLONS no later than 30 days after delivery of the equipment.

7.0 Staffing

The contractor will provide qualified people in support of this effort.

8.0 Period of Performance

The work shall be performed from xxx to xxx.

9.0 Place of Performance

Performance shall be at the contractor's facility.

10.0 Government-furnished Items

The Government will furnish the following materials for this project:

?? TBD

The Government will furnish the following information for this project:

?? TBD

11.0 Additional Information

?? Travel – TBD

?? Security - All deliverables provided under this delivery order are UNCLASSIFIED. Clearances are not required.

?? Coordination with Other Contractors - TBD

?? Other Resources - Incidental resources required in the execution of this task order include the following: TBD

